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OUTLOOK FOR BOSTON AND THE BAY STATE:

ECONOMY AT CROSSROADS

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Outlook for Boston and the Bay State:

Economy at Crossroads

Boston Redevelopment Authority

Policy Development and Research Department

January 18, 1990
Revised February 9, 1990

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Executive Summary

This report provides the Boston Redevelopment Authority's economic forecast for Boston in the light of the outlook for the Bay State economy, and in the broader context of the perspective for the nation as a whole in an era of an integrating global economy. A dozen years of record growth, 1976-88, followed by a slowdown in 1989, and an expected process of recovery in 1990, are projected to lead to a 1990s decade of continued growth with important gains in jobs and income for Boston and the Bay State, though at a lesser rate than that of the roaring '80s.

New advances for the talent-rich, broadly diversified economy of the City and the State are projected to draw on the strength of the services economy in health, higher education, business and professional services, and the hospitality industry; the emergence and expansion of the "new economy" in medical research, biotechnology, computer software, and instruments; the large scale infrastructure megaprojects of the 1990s; and the favorable impact of the "peace economy." The purpose of the forecast is to furnish business leaders, investors, and policy makers with information and data essential to sound planning and decision-making in both the public and private sectors. In addition to providing analyses of trends and projections to the year 2000, the forecast is intended as a basis for longer-term planning into the next century.

- The Boston and Bay State economy enters the 1990s at a pinnacle of its 370 year history. Through the cultivation and pursuit of new forms of economic growth, and the opportunities that accompany such growth, Boston and the Bay State can reach even greater heights over the next ten years. Given strong leadership, the region and its core city are well-positioned to take advantage of the opportunities and benefits of an increasingly global economy and of America's conversion to a "peace economy."

- Throughout most of the 1980s, the Boston and Bay State economy experienced record growth in the key areas of development, employment and personal income. As with all economic cycles, the pace of growth began to slow in 1989. The principal factors in the slowdown have been a downturn in the region's high-tech industry, relatively less growth in services, and continued disarray in the State's fiscal situation.

- Recovery from the current slowdown is expected in 1991, with continued growth projected to the year 2000. The overall rate of employment growth for the 1991-2000 period is likely to be more moderate than that of the 1982-1988 years, but growth in income and output will reflect better gains in productivity. Expansion of employment in certain "new economy" industries gives rise to optimism for the prospects for City and State, as does the opportunity for new investment and the marshalling of talent flowing from reductions in defense spending, and the substantial infusion of jobs from the "mega-projects".

- New forms of economic growth centered around medical and scientific research will stimulate Boston's and the Commonwealth's economic recovery. The presence of many of the world's finest medical and academic institutions provides the foundation for this new research-based growth. With Boston the leading per capita recipient of National Institutes of Health funding for medical research, the area is in a strong position to ensure that cutting-edge discoveries in medicine, biotechnology, and health care services will thrive here in the future. Along with the thousands of jobs to be created by the medical research economy will come thousands more in spin-off manufacturing and services industries.

- It is of primary importance that the Commonwealth pursue a comprehensive plan to nurture growth industries. With other regions eager to capture some of the same industries, this "new economy" cannot be taken for granted. Without such leadership, the slowdown in the region's economy could be longer and deeper than now anticipated. Boston's competitive advantage created by its health and education institutions must be capitalized upon to generate employment, particularly in the spin-off industries.

- Boston and the Commonwealth anticipate that the development investment market will remain strong despite the current slowdown in economic growth, with relative stability in office vacancy rates and property value. Continued strength and stability will be achieved through careful "metering" of commercial development project approvals in accordance with Boston's overall growth management policy, and with the possible application of growth management in the State. Boston's track record in metering the flow of new office space from 1986 to 1989 has been a good one, as evidenced by stable property values and fair market rents, and the second lowest vacancy rate among major U.S. cities.

- With the vacancy rate at 11 percent in the third quarter of 1989 in Boston, and projected to fall even lower, the Boston office market will continue to be strong in the 1990s, with annual supply and absorption averaging 1.2 to 1.4 million square feet.

- A recent overview of the Eastern Massachusetts' real estate market by Salomon Brothers emphasized the fundamental strength of Boston's downtown within the slowing Massachusetts economy. "The industries most affected by cyclical and secular changes in the national and local economy," the report stated, "are located primarily in ... suburban office buildings.... Conversely, those few sectors for which job growth has remained positive, such as FIRE [finance, insurance, and real estate] and services, are largely downtown-oriented and occupy space in the large office towers in the financial district and the Back Bay." While stating that suburban high-tech firms had shed over 15,000 jobs in 1989, Salomon Brothers projected the downtown office market "to remain relatively tight, even in the event of a recession."

- The conversion of the American economy from reliance on defense spending represents a great opportunity for Massachusetts. The "Peace Economy" can channel talent and investment dollars to commercial manufacturing and scientific research, diversifying the economy, and raising its productivity. The role of Boston and the Bay State as a center for higher education, venture capital, and scientific and engineering applications could make the area a leader in the "peace economy".

- The prospects for long-term economic growth in Boston and the Commonwealth will be further enhanced by the very substantial broadening of infrastructure through the "megaprojects" of the 1990s. They include the depression of the Central Artery, construction of a third tunnel beneath Boston Harbor, and the massive clean-up of the harbor itself. The engineers and managers for these projects are already making an impact on the office space market, providing countercyclical demand as other office sectors slow. Together with other planned major public works programs, the $10.5 billion of megaprojects will, in the near-term, provide substantial employment for Boston area construction workers and, in the long-term, lay the base for yet other forms of new economic growth and opportunity in the 21st century.

Introduction

The Boston and Bay State Economy: 1982-1988

In the boom years of 1982-88, Boston gained 71,000 jobs and accommodated $6.8 billion of private development construction, broadening the City's economic base as one of the Nation's preeminent services activity cities. Boston's prosperity went beyond the gain in jobs and investment. Boston's upscale economy, led by growth in finance and services, generated a level of productivity (gross product per worker) higher than that in the metro Boston region, state and nation, with corresponding advances in personal income and wages.

The Bay State generated 700,000 net new jobs in this period, and personal income growth was the second highest among the Nation's states; in 1988, the level of per capita income was third highest.

Property values in Boston appreciated as a 40 percent growth in the City's stock of office space was accompanied by a 30 percent growth in office rents, in the five years 1983-88. Careful metering of development maintained commercial vacancies within a healthy range. Growth in income and property values further embellished the sense of prosperity and enhanced consumer purchases and sales tax yields generated by them.

The final year of the decade witnessed an economic slowdown in the Boston and Massachusetts economies. For the Bay State, the year 1989 was the first since 1982 with no job growth. Employment gains in Boston's services sector also slowed in 1989, as an emerging labor shortage led to job restructuring and automation. A softening of the region's high-tech industry, problem loans for the region's banks, and prolonged disarray in the State's fiscal situation also served to shorten the horizons of some local businesses. Despite these trends, growth in health services continued, and overall employment in Boston for the year was down less than one percent.

Boston's office market economy, while experiencing less absorption in 1989 than in the banner year 1988, nonetheless saw its vacancy rate reduced throughout the year. And, although there was some

attrition in effective office rents, careful metering of new office supply tended to preserve value. Ultimately, the diversified nature of the Boston and Bay State economy served to lessen the impact of the 1989 slowdown.

The Outlook for the 1990s and Beyond

New England Economic Project forecasts for the State economy point to a continuation in 1990 of the slowdown that characterized 1989. Noting the underlying strength and diversity of the City and State economy, recovery is forecast for 1991. Recovery for the Boston and Massachusetts economy would flow from the following factors: a broad and diversified economic base in tune with those sectors of the national economy expanding most rapidly, high level of productivity and income, low level of unemployment, and great talent in higher education, health services, and business and professional services. The recovery will be hastened by the drawing down of the unsold housing inventory, writedown of non-producing loans, and resolution of the need for new tax revenue for the City and the State.

A broadening of the economic base of Boston and the Bay State through a combination of public and private investment will lead to a new era of growth through the remaining years of the decade. Much of Boston's growth will be in "new economy" fields, such as medical research, biotechnology, computer software, diagnostics (instruments), and therapeutics (pharmaceuticals). The basis of this new economy growth is the presence in Boston and the Bay State of several of the world's preeminent institutions of higher education and medicine. The significant need for additional space by these institutions is expected to generate in Boston 300,000 to 500,000 square feet of development construction per year in the 1990s.

Among the public investments to be made, major infrastructure improvements will be realized through a series of "megaprojects:" the depression of the Central Artery, construction of a third Harbor Tunnel and the clean-up of Boston Harbor. In combination with numerous other state and city capital construction projects, the megaprojects will create a substantial number of construction jobs, generating income and tax revenues throughout much of the decade.

These key public improvements will also lay the base for a next stage of expansion of the Boston and Bay State economy.

The overall effect of the "peace dividend"— a shift in National resources away from military spending— on the Boston and Bay State economy could be significant. The area receives many defense dollars, but would likely be a center for alternative investment in commercial manufacturing and scientific research. Smaller federal deficits should lower interest rates, encouraging capital investment in the very industries in which the Boston area specializes. Adding an infusion of talented workers and professionals would raise productivity, more than compensating for the tight labor market and high living costs.

With employment growth in the 1990s projected at 500,000 jobs for Massachusetts and 85,000 jobs for Boston, careful metering of new office space to ensure low vacancy rates and stable property values, public infrastructure improvements, and the planned development of new sources of economic growth, the outlook for the 1990s is bright and promising. Even more significantly, much of what will be achieved in the final decade of this century will serve to set the stage for even greater achievements in the new century that lies ahead.

The International, National and New England Economies

The World Economy

The interdependence of the world economy and the growth of foreign investment will have a large impact on Boston and the Bay State in the 1990s. The European Community's increasing integration will bring a larger, more dynamic, and more unified Western European economy, and the revolution in Eastern Europe adds another dimension providing a well-trained workforce at relatively low wages and an eager consumer market. Boston is the American city closest to Europe, with strong cultural ties and faster travelling times than New York. Progress toward a common European market, currency and banking system may expand opportunities for the region's business. In addition, the recent free trade agreement with Canada is likely to increase economic activity between New England and its northern neighbor.

Massachusetts has been strengthening its links to international markets and becoming a preferred site for foreign business and real estate investment. The value of Massachusetts exports has doubled since 1980, placing it fifth in the nation, and the state's "Export 90s" program has set the goal of doubling it again, from $7.5 billion annually in 1988 to $15 billion by 1993. Evidence of a growing foreign investment in Massachusetts includes a 1988 survey by Peat Marwick, which found 119 foreign companies with U.S. headquarters in the state. Finally, downtown Boston real estate has been a stable investment for European equity and pension funds; recent reports indicate that foreign investors have become more aggressive in Boston's downtown market, with strong interest from the Japanese.

The American Economy

A 1989 forecast of the American economy to the year 2000 has been completed by the U.S. Bureau of Labor Statistics (BLS), using 1988 as the baseline year. The BLS's moderate projection forecasts that the annual average rate of economic growth from 1988-2000 will be somewhat slower than during the 1980s, but that important advances will be made in productivity, exports, and fiscal policy.

Average annual growth of the Gross National Product through the 1990s, expressed in dollars of constant value, will be 2.3 percent, compared to 2.9 percent from 1976 through 1988. Labor force growth will slow appreciably to 1.2 percent per year, with women and minorities providing most of the net new growth. Job growth will have a similar 1.2 percent pace annually to the year 2000, slower than the 2 percent rate of the 1976-1988 period. Output will grow faster than employment because of productivity gains, projected at 1 percent annually compared to 0.7 percent in the earlier period. The nation's shift to services jobs is expected to continue, with strong growth in health care and business and professional services leading the way. Computer-related jobs will still lead the manufacturing sector. Demand for professional, technical, and skilled positions will be strong, requiring an educated workforce. Boston's and Massachusetts' relative specialization in these industries and their well-educated workforce suggest that the area's economy will benefit from these trends.

The American economy is expected to improve in several ways. Exports will advance at a greater rate than imports due to increased capital investment and a rise in American manufacturing competitiveness in the global economy. Fiscal dividends such as reduced budget and trade deficits as well as a rising savings rate would have a beneficial effect on interest rates and investment. With lower interest rates and a nationwide labor shortage, American industry may strive for productivity gains through capital investment and upgrading of workers' skills through education and job training. Defense expenditures as a share of the total economy are expected to decline considerably, favorably affecting industrial growth patterns and offering possibilities for investment and expansion in new directions.

The Region's Economy

Many of the above trends bode well for New England and especially the Boston area. America's economy will be increasingly world-oriented, favoring business locations like Boston and New England with their close links to Europe and Canada. The nation's rapid pace of employment growth will slow, and the baby-boom era of growth in cheap labor will be replaced by requirements for an educated

workforce. Such workers will be capable of adjusting to capital improvements and familiar with the high value added businesses most likely to succeed in a global economy; they will be more productive and highly paid. This plays to the region's strengths as a source of well-trained workers, and lessens the significance of the region's labor shortage and high cost of living.

The outlook for the New England economy through 1992 and beyond has been projected by several economists. The recent three year forecast of the New England Economic Project (an economic forecasting consortium of regional banks and insurance companies) saw a mild recession in 1990 followed by recovery in 1991. The current slowdown in New England and Massachusetts will continue in 1990, with the unemployment rate possibly rising to match national levels and personal income growth slowing. Small job losses will continue in construction and manufacturing, while finance, trade, and government sectors will weaken, and services jobs continue to grow.

By 1991 and 1992 recovery is expected to set in, with manufacturing jobs marking gains, housing starts turning upward, unemployment tracking downward, and total job and personal income growth returning to national norms. The long-term view to 2000 is more positive. Diversification in the regional economy to a broader base will continue in the 1990s, with growth in medical research, biotechnological manufacturing, and higher education.

The Massachusetts Economy

The Bay State economy was a leader among the Nation's states in the 1980s, with the second highest rate of growth in personal income during the period 1982-88, and corresponding gains in the flow of state revenue, which rose by 91 percent in this six year period. Yet serious structural flaws in the economy became evident after 1984, and erosion of the tax base became noticeable after 1986. In 1989, these weaknesses combined with lesser growth in services (a principal mainstay of the economy), an unsold housing inventory, problems of the regional banks, and fiscal disarray of the State executive and legislature, to slow the State economy and make this year the first since 1982 with no advance in employment. The slowdown is expected to continue in 1990 as these latter factors work out of the system. Recovery is foreseen in 1991, and long-term growth, with public policy and private sector leadership, is projected for the 1990s decade, though at a lower rate than that for the 1982-88 years. The ingredients of growth for the 1990s are: the strength of the broadly diversified, talent-rich Bay State economy and labor force; continued growth of the range of services activities of health, higher education, business and professional services, and the hospitality industry; the large scale infrastructure megaprojects scheduled to take off in 1991; the flowering of "new economy" activities in medical research and related biotechnology and pharmaceutical, computer software and "new" high technology manufacturing; the "peace dividend" which will bring investment and skilled manpower to the domestic economy; and the demographics of an older, more experienced and better educated labor force which will benefit productivity.

Overview

Growth in the Bay State economy was extraordinary in the 12 year period, 1976-88, and even more notable in the more recent half of that period, 1982-88, when the personal income growth rate was second highest among the Nation's states, half again as large as the national average, leading to remarkable gains in tax revenue.

However, the growth in the economy and in tax revenue masked serious, long-term structural flaws. There were the begin-

nings of decline in important segments of the economy: job losses in manufacturing since 1984, in high technology industry since 1985, and the peaking of defense contract expenditures in 1986.

The growth in tax revenue, 56 percent in inflation adjusted dollars, 1982-88, also hid weaknesses in the tax revenue base. These included the erosion of the tax structure with the impact of the Federal Tax Reform Act of 1986 on State corporate taxes, the repeal of the State 7.5 percent surtax in 1986, and the puffing up of sales tax revenue as the housing boom accelerated sales turnover and inflated value appreciation and the purchases of affluent feeling consumers.

Structural flaws in the State economy combined with newly emerging factors in 1989 to bring a slowdown in growth in employment, income and revenue. There were the unsold inventory of the wrong kind of housing in the wrong places, the non-producing loans of the regional banks (favoring Florida and Texas, in no small part), and the fiscal disarray of the State executive and the legislature, unable to adapt to slowing growth and a revenue shortfall, while other northeastern states (New York, New Jersey and Connecticut), similarly afflicted, readily accommodated.

Newer long-term factors also contributed to the growth slowdown in 1989. Employment declined in finance, and grew at a lesser rate in services, the mainstay of the 1982-88 boom, as a consequence of job restructuring and automation in response to the labor shortage.

The slowdown in jobs and income is expected to continue in 1990, according to reputable local economists and the projections of the New England Economic Project, as the short-term factors impacting 1989 work their way out of the system. These include reducing the unsold housing inventory, writing-off non-producing loans, and favorably resolving the need for new revenue.

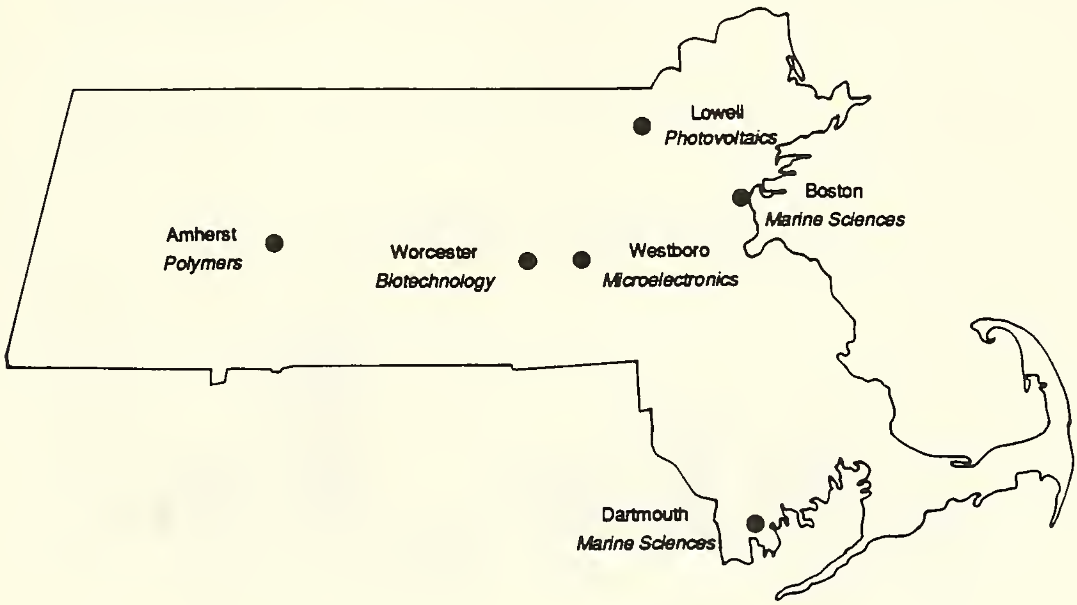
Recovery is anticipated in 1991, and there are good prospects for revival and growth in the remaining years of the 1990s, to the extent that basic strengths of the talent rich, diversified Bay State economy, together with favorable foreseeable factors of importance, respond to forward looking public and private leadership. Foreseeable factors include the large scale infrastructure megaprojects of the 1990s, growth in the medical research, biotechnology, computer

software and related high-technology "new economy" activities, effect of the "peace economy" on productivity and development, and favorable demographic trends. Growth, however, may be at a lower rate than that of the 1982-88 years, according to recent projections of the Massachusetts Department of Employment and Training, and the National Planning Association.

Public policy recommendations center on the need for investment in the future. Expansion of growth and opportunity would respond to public investment in infrastructure, health, education and housing, and in the lagging cities and regions of the state. Our private economy can be counted on to generate "replacement" industries for the slower growth in service and high-tech. Initiatives such as the Massachusetts Center for Excellence shown in Map 1, designed to spin off "new economy" industries, could be important in advancing the Bay state economy.

Map 1

THE MASSACHUSETTS CENTERS OF EXCELLENCE



The Era Of Rapid Growth

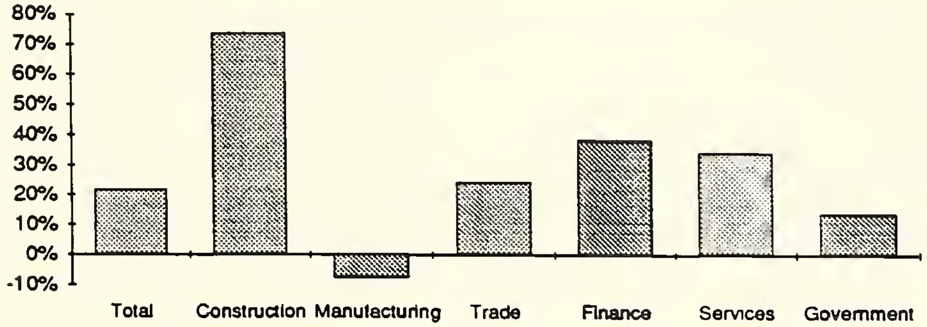
Following the deep recessions of the early 1970s, which decimated the Nation as well as Massachusetts, the growth of the Bay State economy was extraordinary in the 12 year period 1976-88, and the rate of growth even more notable in the second half of that period, the years 1982-88. Record growth went beyond the creation of more than one million net new jobs between 1976-88 (an increase of 39 percent, double that of the 19 percent increment for the United States as a whole); for the more recent 1982-88 years, the job advances were, respectively, Massachusetts 22 percent and U.S. 13 percent. Figure 1 shows rates of job growth for selected industries in the latter period.

Job growth was complemented by even more spectacular increases in productivity (gross product per worker), leading to even greater gains in gross product (the value of the production of goods and services), and consequently in income and state tax revenue.

Gross product per worker grew at an annual rate of 3 percent in the Bay State, in comparison with 2.4 percent for the U.S., between 1982 and 1986 (the latest year for which data is available for the State). Overall growth in gross product over this period was 6.8 percent in Massachusetts, two-thirds higher than the United States' 4.1 percent growth.

Figure 1

Massachusetts Employment Growth, 1982-1988

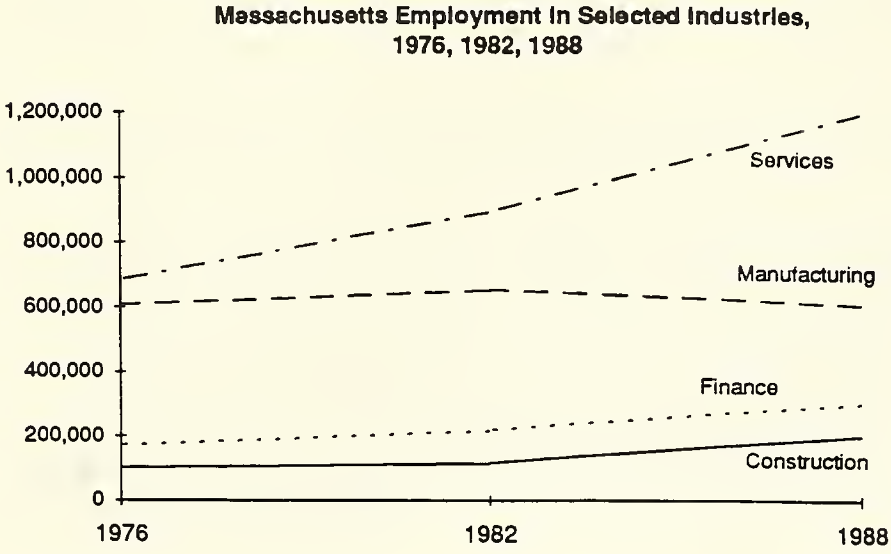


Massachusetts personal income advanced from $40 billion in 1976, to $73 billion in 1982 and $123 billion in 1988. This broadly surpassed the growth rate for the U.S. in both periods, and ranked second among the nation's states in the 1982-88 years, when the rate of increase (in inflation adjusted dollars) was 50 percent greater than that for the U.S. The advance in per capita personal income, from $7,005 in 1976, to $12,751 in 1982 and $20,816 in 1988, was even more notable, 90 percent greater than that for the U.S. In 1988, Massachusetts per capita personal income ranked 3rd highest in the Nation.

Structural Flaws

The phenomenal growth in the Bay State economy masked structural flaws which are now troubling. Employment had expanded from 2.7 to 3.8 million jobs from 1976 to 1988. Figure 2 shows employment trends in selected industries during the 1976-1988 period. Finance and services made up 60 percent of this growth, wholesale and retail trade 30 percent, and construction 10 percent. With 600,000 jobs in 1976, manufacturing made up 22 percent of the Bay State's total employment, but it had no net growth to 1988, ex-

Figure 2



periencing a decline in share to 16 percent of total employment. This occurred even though in 1987 there were 81,000 defense related jobs and 319,000 jobs in high-tech.

The stagnation in manufacturing jobs is all the more serious in the light of trends in defense contracts and high-tech in the Bay State. High-technology jobs in Massachusetts peaked in 1985 and have been declining since. Military prime contracts awarded to Massachusetts peaked in 1986 and have been slimming down since. Services, the backbone of the Massachusetts economy, continue to rise, but growth is projected at a lesser rate for the decade of the 1990s, with automation, job restructuring, and productivity gains in a labor shortage era.

Prospects And Potential For The Bay State Economy

The prospects and potential of the Bay State economy, and state and local revenue are outstanding, with public and private sector leadership. New elements will complement traditionally strong sectors.

The preeminent service sector of the Massachusetts economy, including health, higher education, business and professional services, the hospitality industry, and finance, will continue to grow, though at a lesser rate. Large scale infrastructure megaprojects, including the Central Artery depression, the Third Harbor Tunnel, and the harbor clean-up, will employ an average of 3,800 on-site construction workers for 1991 to 1998, with a peak in 1995 and 1996.

"New Economy" activities— medical research and related biotechnology and pharmaceutical, computer software and "new" high-tech— are already growing and have good prospects.

The "peace dividend" will favor a channeling of investment and talent to "new economy" activities. If Robert McNamara's call for halving defense expenditures is adopted to any significant extent, there would be a fundamental positive impact on the Bay State economy.

Demographics will also favor productivity and growth of the Bay State economy. In a labor shortage era, an older, more experienced, and better educated labor force will increase productivity and advance economic growth.

State Revenue and Expenditures: Origins of the Fiscal Crisis

Bay State revenue benefitted enormously from the extraordinary growth in employment and income, almost doubling in the eight years FY 1982 - FY 1990. This facilitated an almost doubling of State expenditures over this period, enabling the Commonwealth to do many good things, reconfirming Massachusetts' leadership in the Nation as a progressive state with relatively high standards of social services. Most importantly, Massachusetts took the noteworthy step of substantially expanding State aid to offset the impacts, on cities and towns, of Federal aid cutbacks and the reduced property tax revenues under Proposition 2 1/2. In addition, State social programs were broadly expanded, including the path-breaking adoption of universal health insurance. The one area of significant lag in expenditure growth was public investment in infrastructure.

Beginning with fiscal year 1987, however, erosion of the tax base weakened revenue growth, and beginning with fiscal year 1989, the softening of temporal factors reduced sales tax yields. In this circumstance, the lag in proposing compensatory revenue measures and restructuring expenditure programs led to the deficits of FY 1989 and FY 1990.

From 1982 to 1990, State revenue rose at an average rate of 11 percent a year. See Table 1. Revenue growth drew on more than the increase in jobs and income. As housing values rose from $80,000 for a single family home in the Greater Boston Area in 1982 to $183,000 in 1989, as housing turnover increased, and as consumers with rising incomes and newly acquired paper wealth expanded purchases, Bay State sales tax revenue ballooned from $917 million in 1982 to $2 billion in 1988, making up 17 percent of total State revenue in the latter year.

In the meantime, revenue base erosion came into play. The Federal tax reform of 1986 corroded State corporate tax returns, which fell in FY 1988 by 5 percent. The repeal of the 7.5 percent surtax on the State income tax led to no increase in the income tax yield that same year. Also, as housing values stabilized in 1988, as housing sales plummeted, and as consumers became concerned about the

dissipation of their paper wealth in housing, the sales tax yield advanced little in 1989. The relative role of federal dollars also diminished. Altogether, total State revenue rose by only 4 percent in FY 1989, while expenditures increased by 5 percent, resulting in a deficit for the fiscal year. See Figure 3. State government expenditures had increased at an average rate of 12 percent a year from 1982 to 1989. See Table 2. The same factors foreshadow a deficit for FY 1990, and the just-presented Federal budget proposal for FY 1991 will further reduce the federal role and exacerbate the Massachusetts fiscal condition for the next fiscal year.

To deal with the fiscal crisis, two Governor's task forces headed by recognized business leaders, with a roster of eminently qualified and distinguished members from both the private sector and the public sector, issued reports in December 1989.

Table 1

Massachusetts Revenues: 1982-1989 Actual, 1990 Estimate

Current dollars in billions

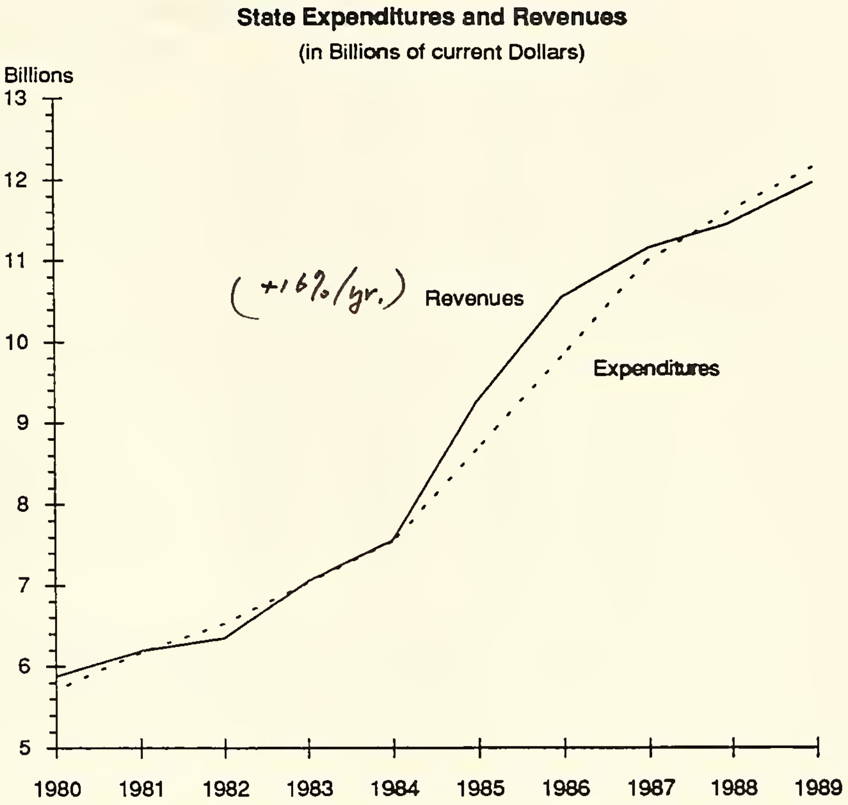
	1982	1984	1987	1988	1989	1990
Taxes:						
Income	2324	2790	3996	3985	4287	4540
Sales	917	1248	1866	2021	2085	1990
Corporate/Other	1396	1616	2241	2270	2390	2281
Total Taxes	4637	5654	8103	8276	8762	8811
Federal Receipts	1037	1023	1247	1473	1450	1490
Non-Tax Revenue*	676	891	1790	1705	1708	1729
TOTAL	6350	7568	11140	11454	11920	12030

Percentage Change

	1982-90	1987-88	1988-89	1989-90
Taxes:				
Income	95.4%	-0.3%	7.6%	5.9%
Sales	117.0%	8.3%	3.2%	-4.6%
Corporate/Other	63.4%	1.3%	5.3%	-4.6%
Total Taxes	90.0%	2.1%	5.9%	0.6%
Federal Receipts	43.7%	18.1%	-1.6%	2.8%
Non-Tax Revenue*	155.8%	-4.7%	0.2%	1.2%
TOTAL	89.4%	2.8%	4.1%	0.9%

*includes: departmental, lottery, and other revenues

Source: Mass Taxpayers Foundation and the State Office of the Comptroller



Source: Massachusetts Taxpayers Foundation and the State Comptroller's Office

Figure 3

The Fiscal Management Task Force Interim Report, under the leadership of William M. Crozier, Jr., Bay Banks President, found that the state's overall tax burden as a percent of personal income was low--about 10 percent below the average of 16 competitive states-- leaving enough room to raise taxes without hurting the economy. A Boston Globe article of January 20, 1990, headlined "Data Show Lower Mass. Tax Burden", reported that "...figures, from the U.S. Census Bureau, show Massachusetts has fallen from 34th to 42nd in the nation in terms of state and local taxes and fees as a percentage of the state's personal income." "Massachusetts is in the paradoxical position of being the third wealthiest state in terms of per capita personal income, but the one with the lowest credit rating", Crozier said. "This matter cannot be tolerated any longer. All of us are being hurt unnecessarily...There is room to bridge ourselves to a new equilibrium with some added taxes..."

Massachusetts Expenditures: 1982-1989

Current dollars in billions

	1982	1984	1987	1988	1989
Operations^	2334	2796	4357	4587	4338
Pensions	186	236	398	343	612
Debt Service	373	442	552	571	603
Medicaid/Other Assist	1717	1774	2274	2463	2456
Local Aid*	1922	2301	3399	3620	3916
Other	0	0	0	15	232
TOTAL	6532	7549	10980	11599	12157

Percentage Change

	1982-89	1984-87	1987-88	1988-89
Operations^	85.9%	55.8%	5.3%	-5.4%
Pensions	229.0%	68.6%	-13.8%	78.4%
Debt Service	61.7%	24.9%	3.4%	5.6%
Medicaid/Other Assist	43.0%	28.2%	8.3%	-0.3%
Local Aid*	103.7%	47.7%	6.5%	8.2%
Other	n.a.	n.a.	n.a.	1446.7%
TOTAL	86.1%	45.4%	5.6%	4.8%

^ includes: agency operations,salaries, and consultants expenditures

* includes: direct, indirect aid, and lottery receipts

Source: Mass. Taxpayers Foundation and the State Office of the Comptroller

Table 2

The Task Force on Financing Local Government, headed by John Hamill, President of Shawmut Bank, recommended an assured 26 percent of the State's revenue for cities and towns, as well as ways and means for increasing local government revenue from own sources. These latter recommendations include raising excise taxes, and modifying Proposition 2 1/2 to allow for property tax revenue growth in line with inflation and infrastructure debt service costs.

A public opinion poll conducted for the John W. McCormack Institute of Public Affairs, U.Mass - Boston, by the Center for Survey Research, in November and December 1989, and published in January 1990, reported that "an overwhelming majority of Massachusetts citizens are willing to pay new taxes as long as the money goes to direct services such as education...," according to a Boston Herald article of January 12, 1990. The purposes favored, and the majorities registered, include elementary, high schools (89%), health care (85%), environmental clean-up (84%), homeless shelter (83%), local aid (71%), public higher education (68%), roads and highways (65%), and drug treatment (58%).

Other states faced with similar fiscal problems readily accommodated by raising revenue and/or reducing expenditures. A New York Times article of May 7, 1989, headlined "In The Northeast, States Face Budget Squeezes", reported that, nationally, state government spending had grown by 52% from 1982 to 1988, in comparison with 66% for Massachusetts. Percentage increases were 67% for New York, 68% for Connecticut, 80% for New Jersey, and a range from 82% to 91% for New Hampshire, Vermont and Maine. A study by Howard Chernick and Andrew Reschovsky, "The Distributional Politics of Fiscal Adjustment: A Case Study of Four Northeastern States", presented at a conference on "State Fiscal Issues" in October 1989, reported on how four states— New Jersey, New York, Connecticut and Massachusetts— dealt with the fiscal squeeze. "All four states prospered fiscally from an economic environment of healthy growth through most of the 1908s, then faced the shock of slowing economies in the last two years," the authors wrote. "They have also faced a common fiscal shock introduced by the Tax Reform Act of 1986...all four states took advantage of their economic good fortune during most of the 1980s to raise expenditures rapidly, while tax rates were unchanged or reduced...in terms of revenue increases or spending cuts, the ranking goes from Connecticut, which enacted substantial tax increases, to New York, with a mixture of the two, to Massachusetts, with mainly expenditure cuts, to New Jersey, where...the adjustments...have been...on the expenditure side..."

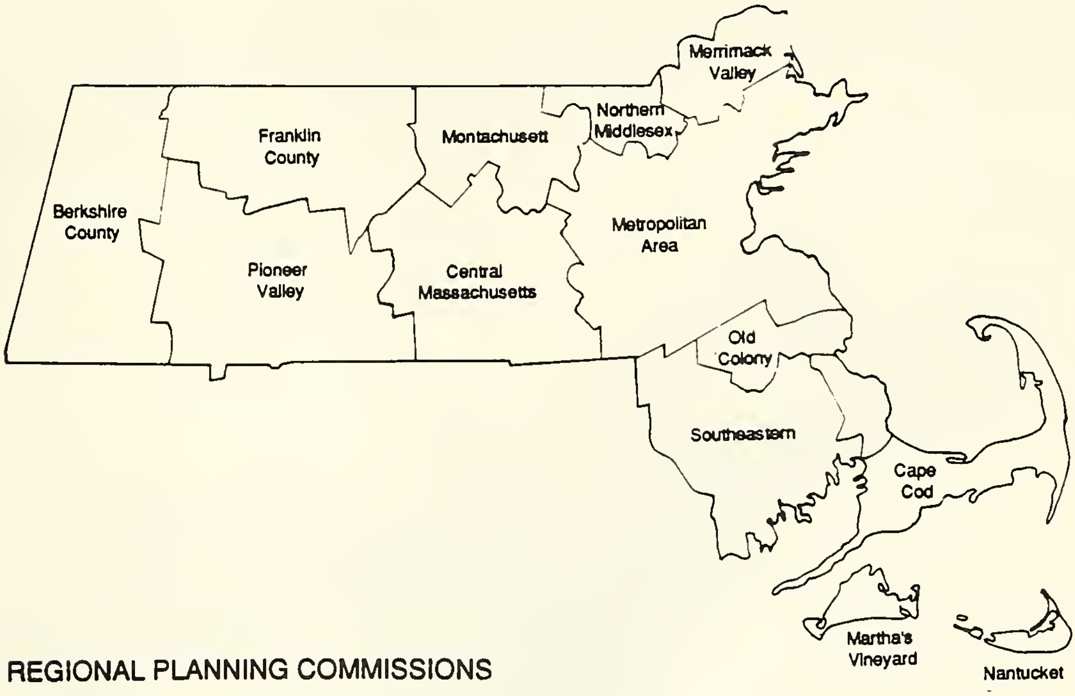
The fiscal disarray through 1989, and 1990 thus far, is wreaking a heavy toll on the State's economy, which may be expected to continue until appropriate fiscal solutions are adopted. A January 19, 1990 article in the Harvard University Gazette, headlined "Massachusetts Struggles with a Budget Crisis", surveyed expert opinion, and reported that "According to Brian Gilmour, vice president for public affairs of Associated Industries of Massachusetts, a statewide organization representing 3,000 member companies, the biggest problem the state faces today is chronic indecision among government officials. This failure has created an uncertain business environment that has firms thinking twice about making further investments in the Commonwealth."

Regional Development

Geographical disparities in economic prosperity during the Bay State's 1976-88 era of rapid growth illustrate the need for regional development policies, growth strategy and growth management to promote growth in lagging regions and cities, and to manage and channel growth where it is most appropriate and can best be accommodated. Designed to address these issues and needs are initiatives that include the Governor's "Targets for Opportunity" agenda, the recommendations of the legislative Commission on Growth and Change, and the creation of the Cape Cod Regional Planning Commission. All of these initiatives should be strengthened.

The Commonwealth's general prosperity in recent years was not shared evenly across the state. Certain regions and cities lagged, with urban poverty which sapped productive strength and family welfare. With only two-thirds of the state's population, the Boston metro region produced three-fourths of the Massachusetts gross product— reflecting lagging productivity and poorer use of labor and capital resources in the rest of the state. As a result, statewide productivity levels remained at about the national average, even though the levels were considerably higher in Boston and its surroundings. Despite a low statewide poverty rate of 8 percent in 1987, the rate was 15 percent in Massachusetts' central cities. These regional disparities are being addressed by government policies such as Boston's Linkage program and the Commonwealth's "Targets for Opportunity" agenda, but much more remains to be done.

Regional development needs and issues must also be addressed through strategies to promote and manage growth of the Commonwealth's regions. The recent report of the Special Commission on Growth and Change recommended a new law empowering the state's 13 regional planning agencies, shown in Map 2, to assess development plans' impact on surrounding towns, the environment and infrastructure. Cities and towns could be made ineligible for state financial assistance unless they complied with agencies' recommendations on development proposals. No veto power would be authorized, however. Reaction to the negative effects of haphazard development



REGIONAL PLANNING COMMISSIONS

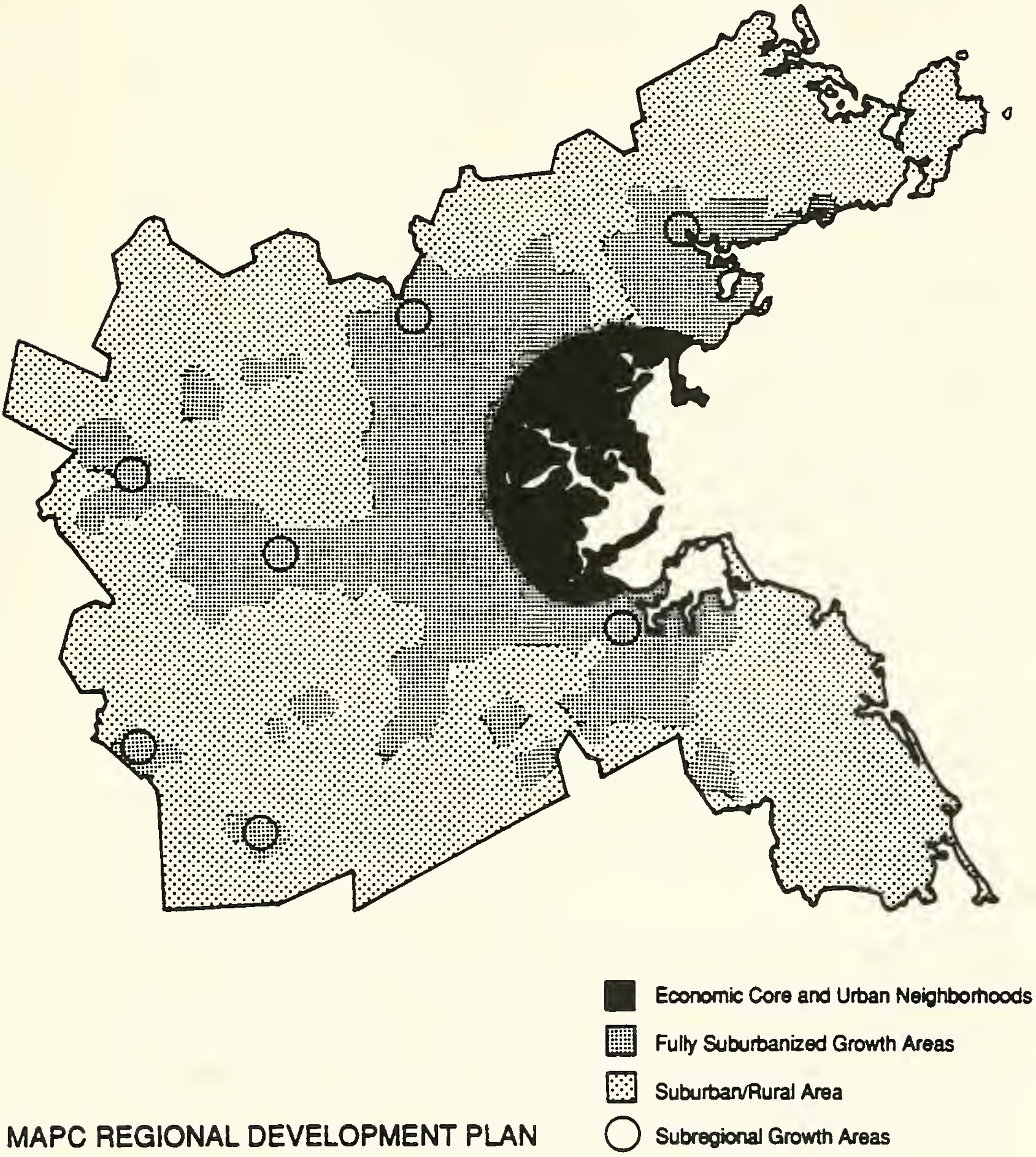
Map 2

on Cape Cod recently led to empowerment of a regional planning commission to manage growth.

In the Boston metro area, increasing concern about the adverse effects of sprawl development led to a November 1989 conference sponsored by the Boston Redevelopment Authority and the Metropolitan Area Planning Council (MAPC). This conference, titled *Future Directions for Boston and the Metro Region*, assessed the region's future and the need for managing growth. The economic and social cost of inappropriate commercial and residential development in the metro area led participants to propose that growth should be encouraged where the necessary infrastructure, labor force, housing and environmental capacity exist to support it. The MAPC's proposed Regional Development Plan guidelines, illustrated in Map 3, identify growth centers in the urban core and surrounding suburbs where capacity ex-

ists for concentrated development and infrastructure improvement. Private and public investment could be channelled to these centers, protecting other areas with fragile resources.

Map 3


Economic Core and Urban Neighborhoods
Fully Suburbanized Growth Areas
Suburban/Rural Area
Subregional Growth Areas
MAPC REGIONAL DEVELOPMENT PLAN

Outlook for the Boston Economy 1990-2000

Boston had gained 116,000 net new jobs in the 12 year period 1976-1988, an average annual growth of 10,000 jobs. The boom accelerated in the 1983-1988 years, with an average annual increase of 12,000 jobs. But Boston lost 5,000 jobs in 1989, an attrition of almost one percent. The slowdown is expected to continue in 1990, with recovery in 1991, and a 1990s decade advance of 85,000 jobs— a lesser rate of growth than in the 1980s.

The 1976-1988 expansion responded to the notable performance of the region's high-tech industry, and was based on Boston's thriving finance and services activities, including health, higher education, business and professional services, and the hospitality industry.

Growth in the 1990s will be somewhat less than the fast-paced advances in income and employment that occurred in the 1980s. Many of greater Boston's speciality industries such as financial, educational, medical, professional, and business services will continue to be vanguard growth industries in the coming decade. Greater Boston will also develop and nurture newer industries including biotechnology and related medical research and manufacturing; financial, professional, and business services based upon a more integrated global marketplace; spin-off industries from institutions of higher education and health; as well as specialized producer services arising from the growth of new primary industries.

All of these elements of the emerging "new economy" will grow faster and thrive if progress is made in addressing critical factors for success such as improvements in education, infrastructure, the environment, housing affordability, and the range of business costs.

Population and Labor Force Trends

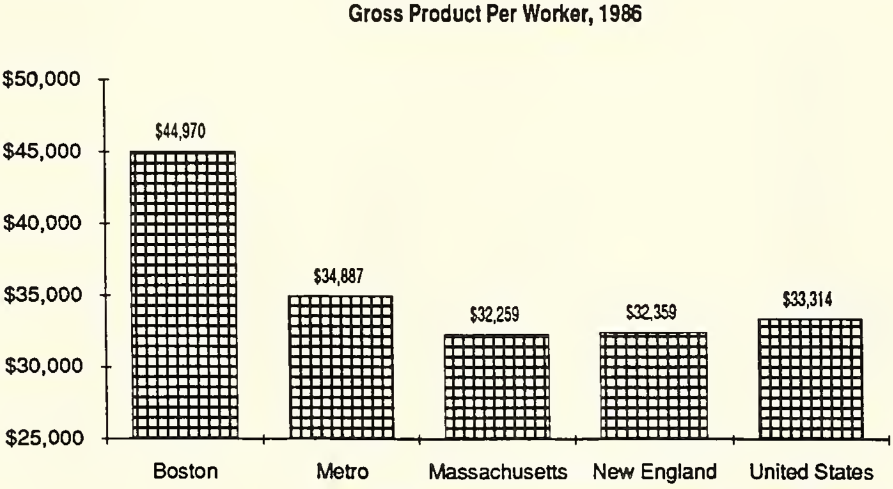
The population of the Boston metropolitan area is expected to increase slightly during the 1990s. Labor shortages may continue in the Boston area because of an inadequate supply of entry-level workers with the skills necessary for many jobs. New jobs will be filled primarily by women entering the labor force, minorities, nonresident commuters, immigrants, and retrained or newly educated residents.

Despite slow growth in its labor force and its high cost of living, increases in productivity have enabled the Boston area to expand its production of goods and services in the past decade and should continue to do so in the future. Boston's economy in 1986 generated $28 billion of production in goods and services, or 24 percent of the state's gross product. That share is larger than the city's shares of state population (10 percent), employment (17 percent), and earned income (21 percent). The productivity of Boston's economy, measured by gross product per worker, exceeds that of the state, region, and nation (see Figure 4). Average output per worker in all industries in Boston in 1986 was $44,970. Measures to accommodate the labor shortage, including automation, job restructuring, and job training and education, may bring further improvement in productivity.

Employment Projections

The BRA projects that more than 380,000 jobs will be added to the Boston Metropolitan economy between 1988 and the year 2000, bringing total employment to nearly three million. The 380,000 new jobs translate into an increase of 15 percent over the projection period, or annual growth of 1.1 percent. This compares with annual job growth rate of 2.9 percent between 1976 and 1988.

Figure 4

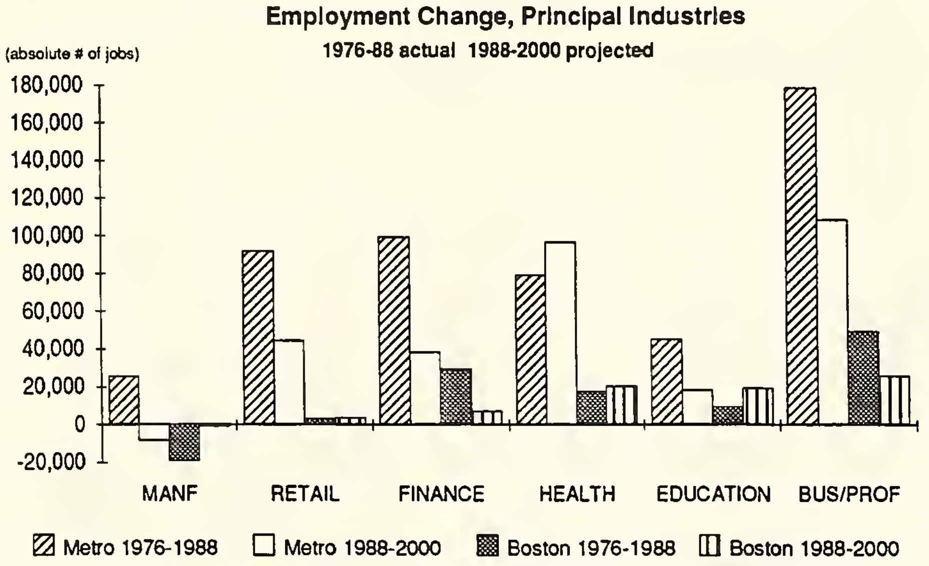


Source: U.S. BEA and BRA Research

In the City of Boston, close to 85,000 jobs are projected to be added between 1988 and the year 2000, bringing total employment to 723,000. The 85,000 new jobs translate into an increase of 13 percent over the projection period, or an annual growth rate of 1.0 percent. This compares with an annual job growth rate of 1.7 percent over the 1976-1988 period. Most of the net increase will be in services sectors.

Services and finance will expand employment by over 77,000 jobs and together they will account for over 91 percent of the total job growth between 1988 and 2000. The largest job growth in services will occur in health services, educational services, and business and professional services, which together will add over 64,000 jobs through the year 2000. The additional jobs in these three sectors account for three-quarters (76 percent) of the total job growth during the period. The employment gain in the finance sector will be concentrated in banking, credit, and brokerage services and real estate, with 10,000 jobs added during the period. That gain will amount to over 11 percent of the total job growth between 1988 and 2000. Employment in insurance will decline by just over 3,500 jobs between 1988 and the year 2000. Figure 5 compares city and metro employment changes for the 1976-1988 and 1988-2000 periods.

Figure 5



Source: BEA and BRA Research. Metro includes Boston.

Retail and wholesale trade will be the other significant source of employment growth in the service-producing sector. The trade industries will add over 3,500 jobs in the projection period, and account for over 4 percent of all net additional jobs. Employment in manufacturing is expected to decline over the period. This is the result of (1) decreases in traditional manufacturing employment in the city and (2) offsetting growth in biotechnology (diagnostics and therapeutics) and new lines of high technology manufacturing.

Advances For Public And Private Wellbeing Through The Growth Economy

A measure of the relative prosperity that economic growth brought to Boston is the reduction of family poverty from 18 percent in 1980 to 11.5 percent in 1989. See Table 3. Poverty for white singles has virtually disappeared, and the two remaining groups in poverty are the minority working poor and single headed households. The lowering of poverty in Boston was all the more notable in comparison with other large cities where poverty has risen, according to a report of the Boston Foundation. Real wages, adjusted for inflation, have risen in Boston, in comparison with the stagnation nationwide, according to Barry Bluestone and Bennett Harrison in The Great U-Turn.

Table 3

Family Poverty Rates: Boston and U. S. Central Cities

	1980				1989 (1987 U.S.)			
	Total	White	Black	Hispanic	Total	White	Black	Hispanic
Boston	18.0%	10.6%	29.1%	42.9%	11.5%	5.6%	13.4%	24.8%
U. S. Cities	15.0%	6.8%	25.9%	28.6%	17.7%	7.4%	32.3%	30.7%

Fiscal Impact of Development: Boston Revenues

Economic growth and development have been the mainstays of Boston's fiscal health in the 1980s. Increases in property tax revenues derived from development and related growth have maintained and even raised the purchasing power of the city's property tax levy since Fiscal Year 1984 (FY84) despite annual inflation rates that outstripped the standard 2 1/2 percent basic levy growth allowed by "Proposition 2 1/2". Increases in state aid have been even more important in sustaining Boston's high level of public services delivery.

Development revenues have been a major component of growth for Boston's "own-source" revenues since Proposition 2 1/2. Boston city government has been rebuilding its own operations and facilities from that point after suffering a $100 million loss (in 1989 dollar terms) in total annual revenues over the preceeding three years.

Boston building permit fees averaged about $12.4 million in annual one-time income from FY84 through FY89. Property tax levy growth through development construction has averaged about $12 million in annual increments to the permanent own-source revenue base over the same period. Other components of tax base growth include new tax accounts, subdivisions, condominium conversions, and the conversion of tax-exempt property to taxable uses has produced over $8 million in further annual property tax levy increments.

Of the $149.7 million growth in Boston's annual property tax between FY84 and FY89, $62.9 million (42%) was due to construction development, $42.9 million (29%) is attributed to the other growth categories of new accounts, subdivisions, etc., and just $43.9 million (29%) was the "2 1/2 % tax increase allowance". By FY89 cumulative growth revenues (development construction, new accounts, and their accumulated 2 1/2 % annual "earnings") totaled $105.8 million, or 22 percent of that year's $483.7 million property tax levy.

Over this same 1984-1989 period, increased state aid distributions have been even more important to the city's fiscal health. The $155.5 million increase in annual revenues that Boston received from the state had its origin in the economic growth that raised employment, income, and spending throughout the state.

The economic growth and prosperity that financed Boston's local public services and investments also financed a steady stream of real (inflation-adjusted) tax cuts in the city and across the commonwealth. This exemplary record of public service delivery and revenue growth was achieved with good fiscal management. Boston's bond rating was successively raised five times in five years.

Advancing Public Services and Improving Public Investments

As the economic boom of the mid-1980s brought new job opportunities and income to the people of Boston, it also provided opportunities for the city to rebuild public services, public facilities, and infrastructure that had suffered decline during the recession of the mid-1970s and again during the initial years of Proposition 2 1/2.

Boston began by rebuilding the basics that support further private growth and that include its population as partners in that growth. Between FY84 and FY89 the city expanded expenditures for public works, libraries, and parks and recreation programs at an average annual rate of 4.3 percent, adjusted for inflation. See Table 4. Public safety and inspection expenditures rose at a 3.9 percent average annual rate, mirroring the 3.8 percent rate of real decline over the 1980-1984 period. School spending rose at a 2.8 percent annual rate since 1984, adjusted for inflation, as did spending for General Government, Development, and Human and Veterans Services. City spending for judgements, claims, and district charges

Table 4

City of Boston Expenditures: Annual Increases 1980-89
In Constant 1989 Dollars

	Total Increase	Average Annual Increase	
	80-89	80-84	84-89
Capital Outlays			
Annual Outlays from the Capital Projects Fund	53.9%	-13.1%	22.0%
Operating Expenditures from General Fund			
I.General Government/Property and Development/ Community Development/ Human Services/Veterans Services	8.9%	-1.3%	2.8%
II.Public Safety/Inspection	3.8%	-3.8%	3.9%
III.Public Works/Libraries/Parks and Recreation	15.5%	-1.6%	4.3%
IV.Schools	5.0%	-2.3%	2.8%
V.County/Judgement and Claims/MDC&MBTA	-17.7%	-1.2%	-2.9%
VI.Retirement Costs/Other Employee Benefits	4.1%	1.5%	-0.4%
VII.Debt Services	-37.7%	-8.5%	-2.4%
Total Operating Expenditures	-1.0%	-2.4%	1.7%

declined, as did retirement and employee benefits costs and debt service. The overall result was a Fiscal Year 1989 Boston budget that was one percent lower than its 1980 spending, in constant dollars. Despite this belt tightening, the 1989 budget provided 15.5 percent more support to Public Works, Libraries, and Parks as well as 8.9 percent more for General Government, Development, and Services, 5 percent more for schools, and 3.8 percent more for public safety, compared to the 1980 budget.

Boston's capital investment program has also recovered from the impact of Proposition 2 1/2. Annual city outlays for capital facilities and infrastructure dropped precipitously from $104.5 million (1989 constant dollars) in Fiscal Year 1980 to $10.5 million in FY82. Rebuilding showed itself to be well underway in 1987 when capital outlays grew to $63.8 million, and in 1989 Boston renewed and expanded its public capital by $160.9 million.

The Role of Private Growth and Development in Providing Public Benefits

Private development projects entering the Boston Redevelopment Authority's production pipeline are leading further advances for job opportunities, tax revenues, and contributions to the city's housing and job training trusts. The eight major projects presented in Table 5 are BRA approved and in the pipeline for the 1990s. The nearly $2.7

Table 5

Downtown Projects Public Benefits Summary

Project	Gross Square Feet	Total Development Cost	Annual Taxes	Construction Worker Years	Permanent Jobs	Housing Linkage	Jobs Linkage
Prudential	1,800,000	$387,000,000	$9,300,000	2,200	5,600	$7,275,000	$1,455,000
One Lincoln Street	995,000	$325,000,000	$4,500,000	2,000	4,000	$4,300,000	$900,000
International Place II	726,000	$183,000,000	$2,637,630	1,032	2,398	$2,500,000	$100,000
Olmsted Plaza	1,446,000	$325,000,000	$3,000,000	1,700	4,200	$6,730,000	$1,346,000
125 High Street II	448,000	$120,000,000	$1,634,400	677	1,816	$2,241,340	$448,268
Boston Crossing	2,952,000	$750,000,000	$11,000,000	6,750	11,000	$14,200,000	$2,840,000
Ruggles Center I*	215,000	$40,150,000	$885,000	208	774	$925,000	$185,000
Commonweath Center	1,858,000	$550,000,000	$10,000,000	4,950	6,300	$8,000,000	$1,610,000
Total	10,440,000	$2,680,150,000	$42,957,030	19,517	36,088	$46,171,340	$8,884,268

*Excludes garage square footage

billion of investment is projected to generate $42 million in annual tax revenue, $46 million in housing linkage and almost $9 million in jobs linkage. The projects are expected to produce nearly 20,000 construction jobs and over 36,000 permanent jobs.

Office building construction underway in downtown Boston in 1990 ranked sixth highest among 46 large U.S. cities, according to Torto-Wheaton Associates/Coldwell Banker; Boston was topped only by Chicago, Los Angeles, midtown Manhattan, Washington, D.C., and Philadelphia. Of these cities, only Washington has an office vacancy rate lower than that of Boston.

Boston's "New Economy"- Emerging Growth Industries

The educational, medical and research institutions of Boston and Cambridge have been the key to the prosperity enjoyed by the Boston metro area in the 1980s and in earlier decades. These same institutions are instrumental in nurturing the technology and workforce that will power the emerging industries of the 1990s.

Past Economic Growth

The prosperity of the Boston metro area in the 1980s had been advanced in part by the local growth of computers and electronics companies, with the Route 128 area one of the great centers of the world's fast-growing technical industries of the past two decades. The genesis of these businesses was in the great educational institutions of Boston and Cambridge, and their growth was financed and supported by the banks, venture capitalists, and legal, professional, and business services located in Boston's downtown. These electronic and computer companies are now maturing, and have entered a period of slowing growth.

Current Economic Growth

Nationally, the demand for health care services continues to rise due to economic affluence, the demographics of an aging population, and the introduction of dramatic new technologies. U.S. employment in health services is projected to rise by an average 3.0 percent annually through the year 2000, much faster than the 1.2 percent benchmark for the overall economy. Industries that manufacture medical products are also projected to show exceptional growth, and medical products that embody the most advanced technologies will enjoy the most rapidly expanding markets.

The Boston economy specializes in health care, with 68,000 jobs making up eleven percent of the city's total employment. Boston's health sector specializes in hospitals, which account for seven percent of all Boston employment, more than twice the national average. Most Boston hospitals specialize in certain medical treatments; for example, the New England Deaconess Hospital has a special unit devoted to treating Aids patients. This specialization has enabled Bos-

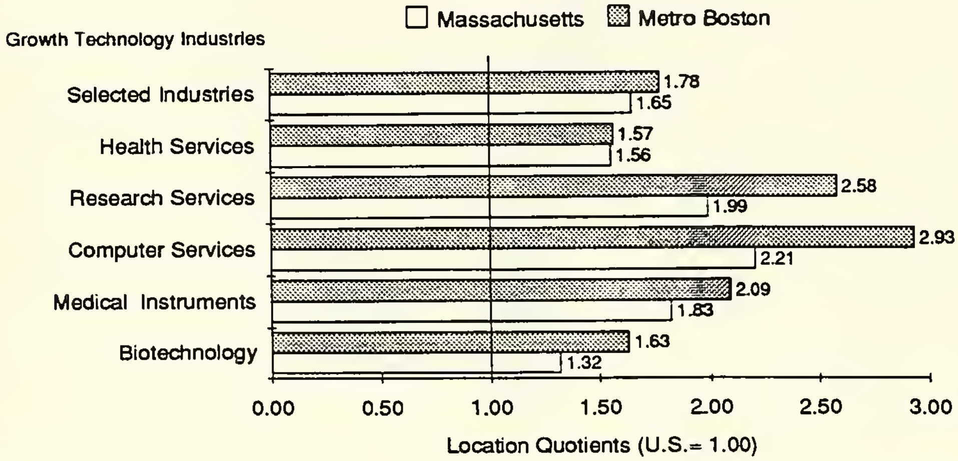
ton hospitals to sustain high occupancy rates while less specialized hospitals have had to close.

A second factor influencing the future of the Boston hospitals is the diversification that has occurred from a purely clinical treatment perspective to both treatment and research of various diseases and therapies. This diversification into research has enabled the Boston hospitals to attract some renowned doctors and researchers, who have collectively brought in hundreds of millions in research dollars annually to the Boston economy. This research activity is experiencing phenomenal growth, adding jobs and new facilities and expanding funding sources. Over the next decade the medical research institutions will add an estimated 2.8 million square feet of research space and employ at least 4000 new researchers.

Future Economic Growth

A new generation of technical-based growth industries is emerging from institutions in the Boston metro core. The educational, medical and research institutions are now not only carrying out basic research in the biotechnical and medical fields but they are generating a number of spin-off private companies. The number and size of these new companies are expanding rapidly, although from a small current base.

In addition to biomedical industries and health services, the private sector industries of computer services, and technology and management business services are technology driven industries with exceptional growth prospects and a very high degree of concentration in the Boston metro area. The high degree of interdependence among these dynamic industries is important to the metro area's future economy. Their individual successes create more business for one another, multiplying employment and business opportunities for the regional economy. Figure 6 shows the location quotients of several growth technology industries in Massachusetts and Metro Boston. A location quotient of 1.00 indicates that an area has the same employment concentration for an industry as the United States as a whole. A quotient higher than 1.00 indicates that an area specializes in that in-



Location Quotients In Selected Growth Technology Industries In Massachusetts and Metro Boston

Figure 6

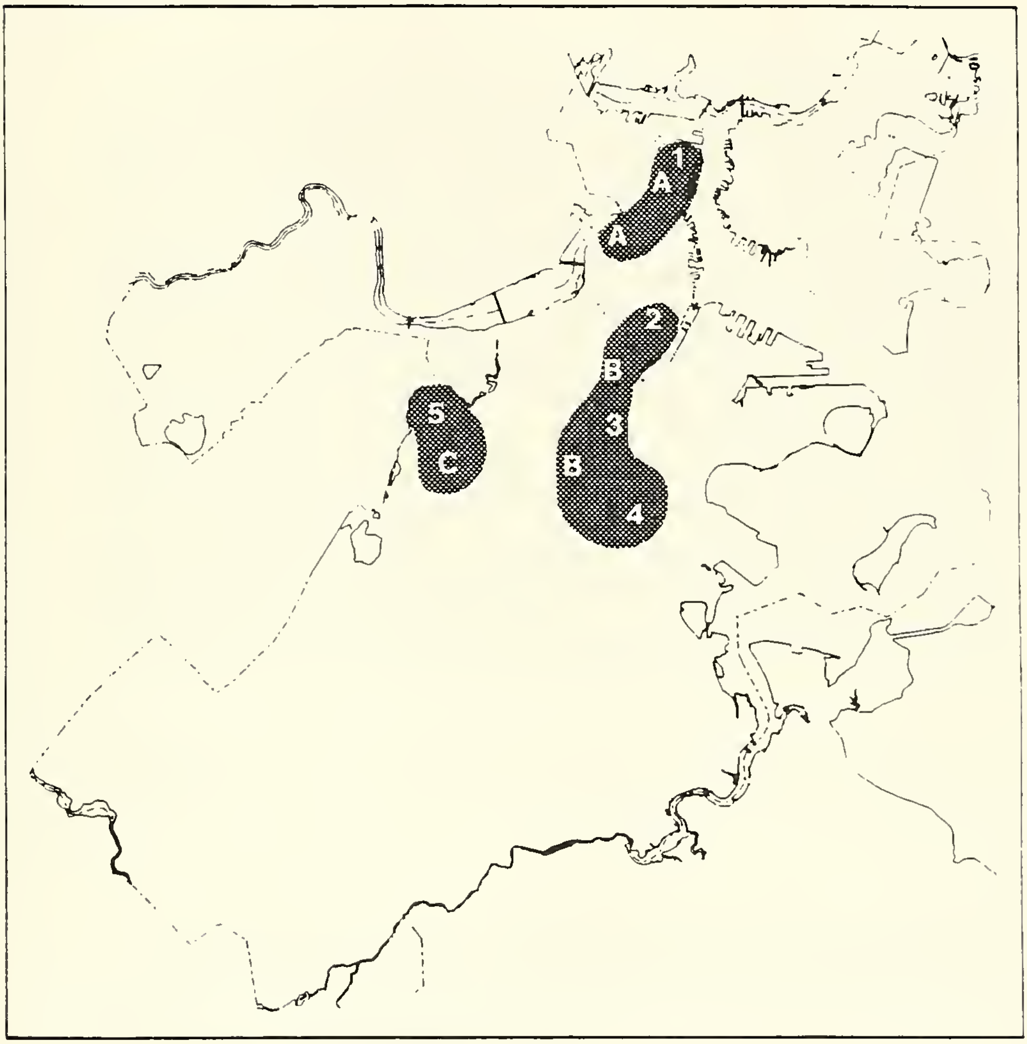
dustry. Massachusetts' and Boston's quotients are high in these growth industries.

Institutional Demand for Research Space

There are a total of 25 Medical Research Institutions (MRIs) in Boston; seventeen are research hospitals, five are non-profit research institutes and three are medical schools. There is a total of 2.6 million square feet of research space housed in these institutions. The MRIs collectively have expressed a demand for 2.86 million square feet (s.f.) of new research space over the next several years. Hospitals and medical schools have submitted plans and proposals for 1.96 million s.f. of additions. A further 900,000 s.f. of needed space was reported by hospitals and non-profit research institutes in the BRA's 1987 Medical Industry Study, but has not yet appeared in any project proposals from the institutions.

Demand for research space might be met outside an institution's campus, such as at the Boston Science Center, Olmsted Plaza, or the South Station Technopolis; plans for institutional additions may change according to the availability of such space. The current and future centers of research activity are shown on Map 4 below.

BOSTON TECHNOPOLIS CENTERS



Medical Research Areas
- A: West End/Charlestown Navy Yard
- B: South Bay/Newmarket
- C: Longwood/Fenway

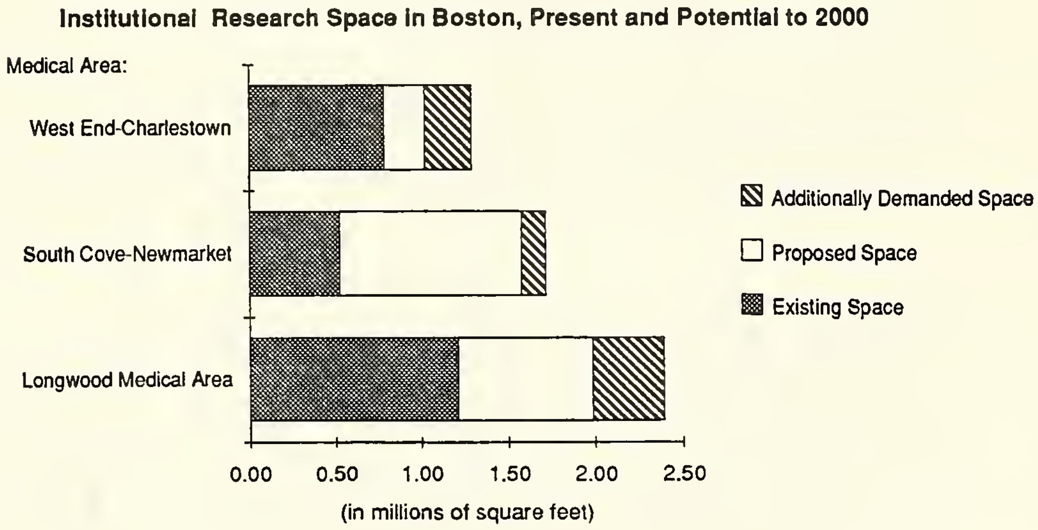
Medical Research Centers
- 1: Building 149
- 2: South Station Technopolis
- 3: South End Technology Square
- 4: Boston Science Center
- 5: Olmsted Plaza

▨ **Medical Research Area**

Map 4

Geographically, the institutional research space is concentrated in three areas, as seen in Map 4. The Longwood Medical Area contains about 1.2 million s.f., nearly half of the city's total. The Longwood institutions need an additional 1.2 million s.f. of research space, over 40 percent of the expected demand in the city. The West End-Charlestown Medical Area is the site of 782,000 s.f. of institutional research space, which is about 30 percent of Boston's current inventory. In the 1990s the West End-Charlestown institutions will need an additional 509,000 s.f., or 18 percent of total city demand. The South Cove-Newmarket Medical Area wants to triple its medical research space from its current 524,000 s.f. with an additional 1.2 million s.f., which is 42 percent of the total amount of the new institutional research space in demand. See Figure 7. The remaining hospitals scattered throughout Boston have approximately three percent of existing research space, and propose to add 95,000 s.f. to their existing 75,000 s.f.

Figure 7



Institutional Demand for Research Personnel

There are approximately 7,870 full-time equivalent (FTE) jobs accommodated in the research space occupied by the medical research institutions in Boston. The future research space would accommodate between 3,990 and 6,330 new FTE research positions depending on how densely the staff occupies new and existing space. Nearly half of Boston's employment in medical research is located in the Longwood Medical Area, which contains 3,560 employees. The space needs expressed by the Longwood MRIs will house between 1,520 to 2,500 new employees. The West End-Charlestown Medical Area contains an estimated 2,220 research positions, 28 percent of the city's total, and the new space required would accommodate between 580 to 1,120 new positions. The South Cove-Newmarket Medical Area now has 1,860 research jobs, which is 24 percent of the city total. Its space needs will acommodate between 1,770 and 2,520 new research jobs. Other hospitals in the city employ 230 research workers, which is 3 percent of the total. They expect to hire between 130 and 200 research workers in the future.

Institutional Research Funding and Sources

The future demand for institutional research space and employment is heavily dependent on the availability of funding for research projects. The two major sources of research funding for the medical research institutions are the federal government and corporate-sponsored research agreements. According to the BRA's Medical Industry Survey, in 1986 Boston's research hospitals received 63 percent of their funding from the federal government and 18 percent from private corporations.

The federal funding of research is disbursed by the National Institutes of Health (NIH) and the National Science Foundation (NSF). According to the most recent NIH Grants and Awards report, the United States funding for NIH projects rose from $3.0 billion in FY1981 to $4.7 billion in FY1988 in constant dollars, an annual rate of growth of 6.6 percent beyond inflation. The Commonwealth of Massachusetts' portion of NIH funding increased from about $317 million in FY1981 to $503 million in FY1988, which was an annual

growth rate of 6.8 percent. The share of NIH money flowing into Massachusetts has increased from 10.5 percent of all US NIH dollars in FY1981 to 10.6 percent in FY1988. The City of Boston portion of U.S. NIH funding escalated from $227 million in FY1981 to an estimated $352 million in FY1988 which was an annual rate of growth of 6.5 percent. Boston's share of total NIH funding is hovering around 7.5 percent of total U.S. funding, and it gets about 70 percent of the Massachusetts total. In essence, Massachusetts and Boston were receiving sizable portions of an expanding pie.

Another source of funding for basic research is the National Science Foundation (NSF), which, along with NIH, will be disbursing $3 billion throughout the 1990s for the Human Genome project. This project aims to map the human genetic structure and has captured the imagination of the current Congress similar to the way the space program captured the imagination of Congress in the 1960s.

The private funding of medical research has advanced in the 1980s with two mega-deals between Massachusetts General Hospital and two large international corporations. The first arrangement was made in 1981 with the German drug and chemical conglomerate Hoechst A.G., for $68 million. The second agreement was announced in the summer of 1989 with the Japanese cosmetic firm Shiseido which involved a grant of $85 million over the 1989 through 1999 period.

Biotechnology

The private Biotechnology drug industry is quite small, representing 0.02 percent (2 percent of one percent) of national employment in 1987, but it is also growing rapidly, with national employment increasing at a 9.5 percent annual rate between 1984 and 1987. Massachusetts does have a concentration of biotechnology firms and employment, showing the state's comparative advantage. Within Massachusetts, 86 percent of the state's biotechnology employment was in the Boston metropolitan area in 1987, according to the U.S. Dept. of Commerce.

Medical Instruments

Allied with the biotechnology drug industry is the medical instruments industry, which is presently nearly 10 times the size of Biotech (S.I.C. 2831) and which is maturing as a strong New England and Massachusetts "complete" industry (research, administration, and manufacturing). Twenty percent of total U.S. sales in biomedical instruments (such as intensive care equipment and fetal monitors, and laboratory equipment) are sold by New England manufacturers. Massachusetts has double the national level of employment concentration in this industry, and 80 percent of the state's medical instruments employment is in the Boston metropolitan area.

Other Growth Industries

Private industry sectors delivering the most advanced new products and services to the fastest growing markets include research/management/consulting/testing business services and computer software and services. Computer software and services is the strongest sector considered by a recent Bureau of Labor Statistics study, with 4.9 percent annual job gains projected. The Boston Metropolitan area has nearly three times the national average proportion of total jobs in this industry, and 93 percent of Massachusetts state employment in this industry is in the metro area.

The second fastest growth sector is research/management/consulting/testing business services which has a projected annual rate of employment growth of 3.2 percent. The Boston Metropolitan area has more than 2 1/2 times the national average employment concentration in this industry and 91 percent of the Massachusetts employment in this industry is in the metro area.

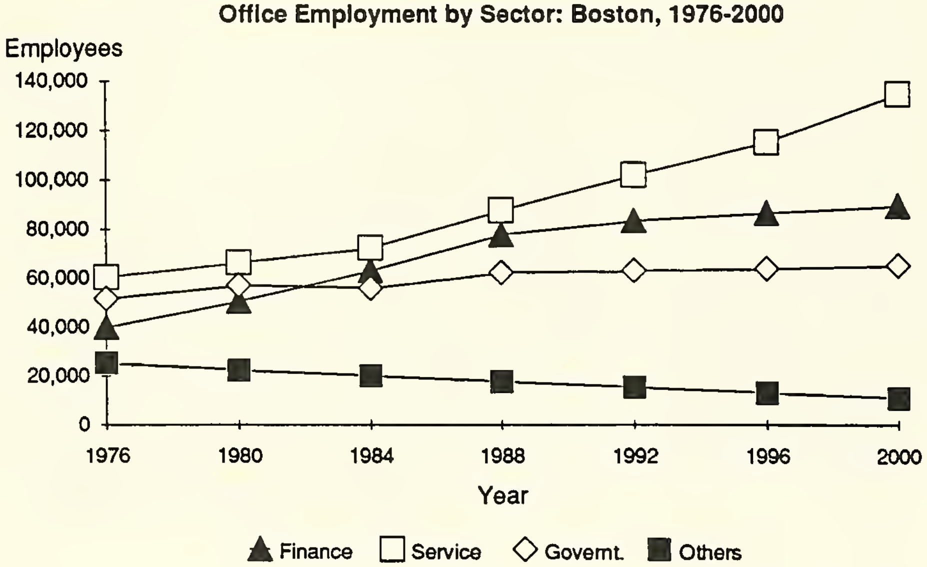
Even if we combine all these sectors with biotechnology and medical instruments, they now constitute less than 4 percent of state employment. By the year 2000, however, their combined workforce will have grown by two thirds if they expand at projected national rates.

The Boston Office Market, 1990-2000

Despite recent softness in office absorption — due chiefly to cautious behavior on the part of financial and services industries — Boston's office market continues to be quite healthy. The City's office vacancy rate, currently at 11%, is well below the national rate of 16.4% and places Boston among the top few major-city office markets in the nation. Rent rates continue to be strong and building values remain firm.

Projections for the future of Boston's office market economy are also quite favorable. Between 1989 and the year 2000, demand is anticipated for 53,000 new office jobs and 12-14 million square feet of new office space. Figure 8 traces office employment growth by sector. This translates to an average of 1.2 to 1.4 million square feet of absorption annually over this period, an estimate in accord with the City's twenty-year average. The BRA projects that new office development in the next decade will occur at a rate that matches projected demand, a function of the BRA's metering of the market. This will ensure that Boston's office market economy will continue to grow at a healthy pace

Figure 8



and contribute to Boston's reputation as a sound environment for investment.

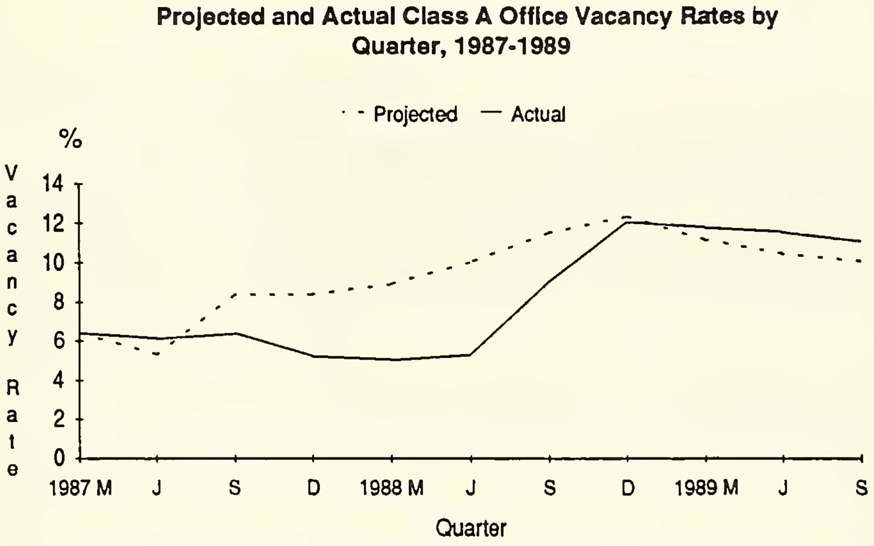
As the pre-eminent center of financial, legal and other professional and business services in New England, as a leader in education, science and technology research, and as a desirable and attractive city for living and visiting, Boston will continue to be a strong center for economic growth.

Metering Development: The Track Record, 1987-1989.

Boston's policy of metering the flow of new office supply to maintain a consistent and orderly market with stable property values and fair market rents shows very good results from 1987 through 1989. Boston maintains a healthy office market compared to the nation's other cities; as of June 1989 Boston at 11.5 percent had the second lowest vacancy rate among major U.S. cities.

In 1986, drawing on an extensive survey of tenant firms and office building owners and managers, the BRA began monitoring the office market, focusing on the supply and demand for office space. Based upon the scheduled pipeline of new office space completions and projected levels of future office space demand, detailed quarterly forecasts of office vacancy rates have been produced.

Close monitoring of the office market by Boston has enabled the city to pace the approval of new office development projects to match the demand. The first office market study reported on the Fourth Quarter 1986 market, showing a vacancy rate of 5.7%. The record from 1986 through Third Quarter 1989 shows that Boston's Class A office vacancy rate has remained below 12 percent. Figure 9 compares the BRA's June 1987 projections of vacancy rates to the actual record. These results have maintained a balance between owners and tenants where investment return is good and consistent while rents are fair to tenants. Metering of new development into the next decade at a rate of about 1.2 to 1.4 million square feet annually to match demand should sustain a healthy and growing office market. This projected demand is based on the average annual absorption rate for the last twenty years, about 1.3 million square feet.



Source: B.R.A. Research Department. Projections from BRA Publication No.284, June 1987.

Figure 9

Metering of the office market has brought a more rational management to the Boston office market and has kept it healthy for both tenants and investors. Space has expanded to accommodate the needs of tenants at reasonable rental rates, while management of the market has served to maintain Boston as an extremely positive investment environment.

Boston has not suffered in the way that many other cities in the nation have from an over-supply of office space. High vacancy levels result in rent concessions to tenants of other space within the city, so even fully occupied buildings are threatened with a loss of income-earning capacity. Declines in rental rates and consequently rental income can endanger repayment of real estate investments, causing a ripple effect on the local economy and hampering new investment. A stable office market such as that in Boston also stabilizes employment in the industry, avoiding the boom and bust cycles which have brought dramatic reversals in cities with unmanaged growth.

The Class A Office Market Today

Boston's "Class A" office space is comprised of 127 buildings totalling 32.3 million square feet of office space (as of the end of the third quarter of 1989). Of this total, 24.6 million square feet is located in the Financial District (76.3 percent), 6.3 million square feet is in the Back Bay (19.6), and 1.3 million square feet is in the Government Center area (4.1 percent).

At the close of the third quarter of 1989, the vacancy rate for Class A office space was 11 percent. This rate was fractionally lower than both the 11.5 rate in the second quarter of 1989, and the 12 percent rate at the end of 1988. Although the 11 percent figure was still double the 5.3 percent rate in mid-1988, the vacancy rate's recent behavior nonetheless reflects a stabilization of the Class A office market. While leasing has slowed, vacancy rates are expected to decline as a result of the metered supply of new space coming on line in the next 18 months. The projects now approved and in the pipeline will be ready for occupancy as leasing activity picks up, ensuring that in the future, vacancy rates do not drop too low.

BRA Vacancy Estimates Compared to Private Real Estate Firms.

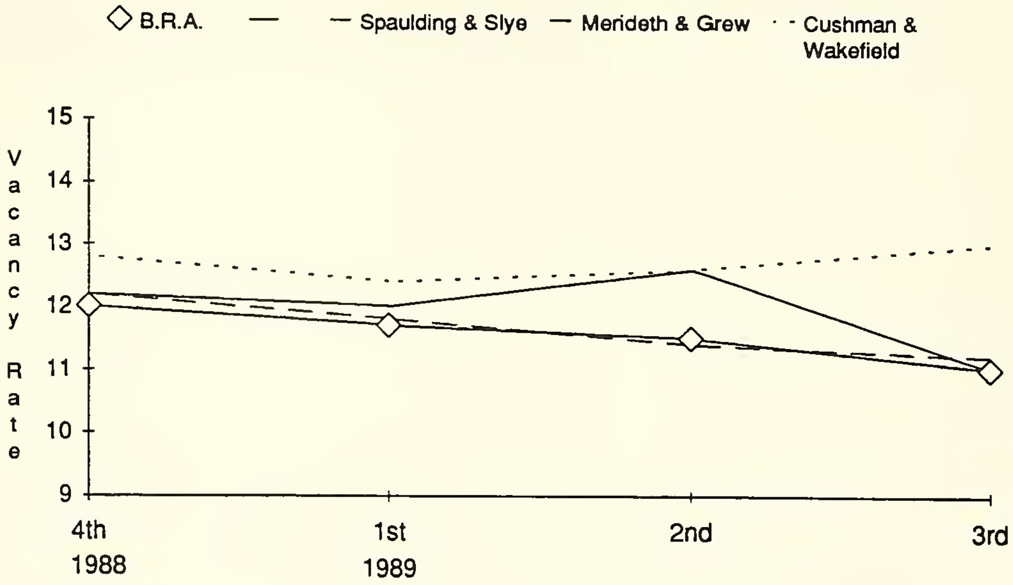
The BRA's estimates of current trends in vacant office space parallel those generated by private real estate firms which monitor office occupancy figures. A comparison of recent reported vacancy rates is provided in Figure 10. The differences between the BRA estimates and those provided by private realty firms are largely the result of the inclusion of some Class B space in the estimates of the private realty firms. Class A space is defined by the BRA as any office space, in a building built or renovated since 1959, located within the downtown area and commanding an entry rent of at least $20 per square foot annually. Real estate firms include in their vacancy estimates buildings in the fringe areas of downtown such as Fort Point Channel and Charlestown, and downtown buildings which do not meet the BRA criteria for Class A office space. The BRA estimates are drawn from Spaulding and Slye occupancy data for each building. However, Spaulding and Slye base their data on upwards of 160 buildings, while the BRA recognizes only 127 of them as Class A office buildings. Consequently,

even with the same data source, the BRA vacancy estimates and those reported by Spaulding and Slye differ.

Spaulding and Slye reported a third quarter 1989 vacancy rate of 11.2 percent, and other Boston real estate agencies report similar findings. Meredith & Grew reported an overall vacancy rate of 11 percent, in comparison with the 12.6 percent for the second quarter and the 12.2 percent in the fourth quarter of 1988. Cushman & Wakefield reported an overall 13 percent vacancy rate for downtown, up slightly from 12.6 percent in the second quarter.

Figure 10

Comparative Class A Office Vacancy Rates, Year-end 1988 through Third Quarter 1989

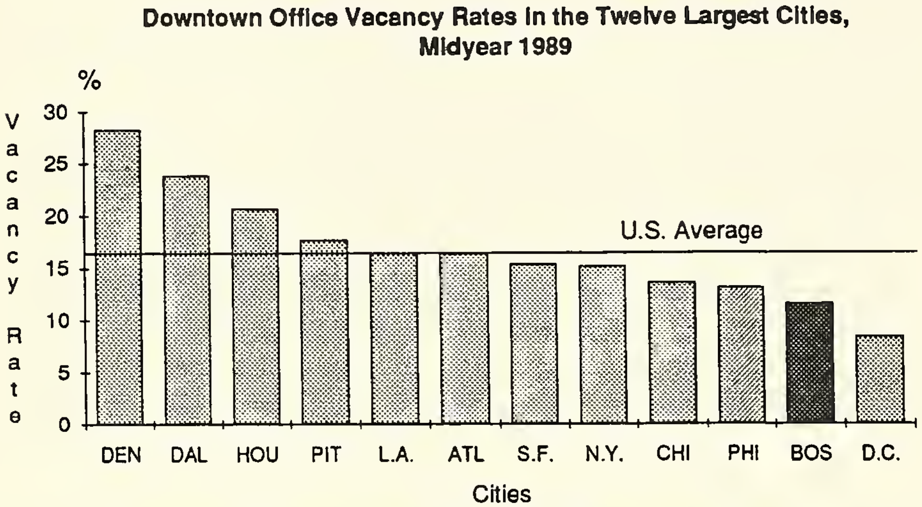


Comparison of Downtown Office Markets in Large U.S. Cities

Despite some recent softening in Boston's office market, most indicators remain strong compared to other major U.S. downtown office markets. Figure 11 compares Boston's downtown office vacancy rate in mid-year 1989 with those for the nation's eleven other major markets. The 11.5 percent office vacancy rate for Boston, as measured by the BRA, ranked second lowest out of the twelve cities as measured by The Office Network— and Boston's rate has fallen to 11 percent since that time. Only Washington, D.C. topped Boston as the best downtown office market in the nation. The U.S. average downtown office vacancy rate at 16.4 percent was forty percent higher than Boston's rate.

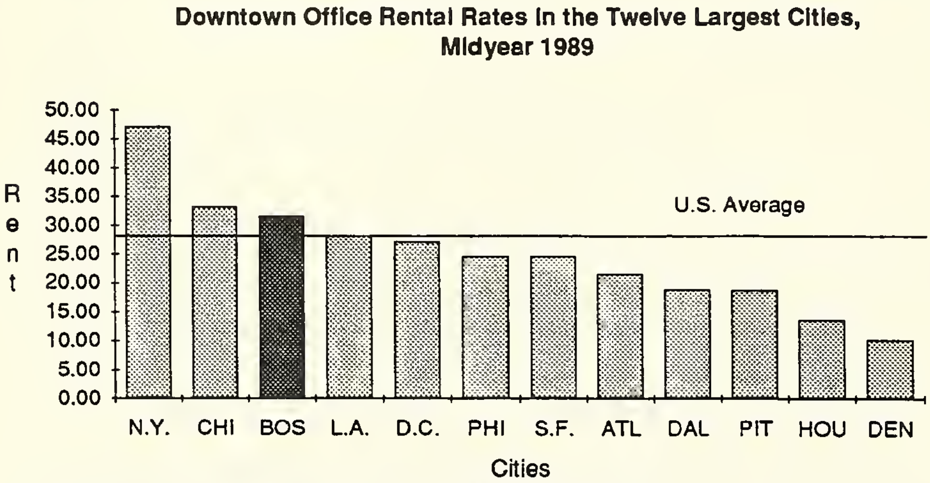
A comparison of downtown office market rents for the twelve largest office markets in the nation shown in Figure 12 indicates that Boston's average rent remains relatively high. Boston's average rent of $31.43 ranks third highest of the twelve cities, trailing only New York and Chicago. Boston's rent has remained at around $30.00 for the past two years as the market slackened.

Figure 11



Source: B.R.A. Research Dept. and The Office Network, Midyear 1989.

Figure 12



Sources: B.R.A. Research Dept. and The Office Network, Midyear 1989.

Pipelines of Proposed Office Projects 1990 to 1994.

With the expectation that Class A vacancy rate will decline further during 1990, and rise only slightly in mid-1991 and mid-1993 due to new project completions, the long-term prognosis looks very good.

In order to maintain healthy occupancy levels, the BRA projects the future demand for office space and contrasts this demand with scheduled and proposed supply. This analysis generates projections of future vacancy rates in the Boston office market. These projections can be used to estimate the range of additional supply required to both satisfy demand and maintain acceptable occupancy levels in a range between 8 and 12 percent. At a vacancy rate of less than 8 percent, rents rise too fast and dampen tenant interest. At a rate significantly higher than 12 percent, rents drop and the market is less attractive to investors.

Table 6 presents a projection of the supply of Class A office space in Boston through 1994. This represents an estimate of the size, likelihood of construction, and completion dates for major office projects under construction, approved, or proposed for that five year period. The projection contains projects totalling 7.1 million square feet, of which 5.1 million will be built in the Financial District, 1.6 million in the Back Bay and 0.4 million in the Government Center area.

Table 6

BRA Projected Supply of Class A Office Space, 1990-1994

1990	1991	1992	1993	1994	Total
930,131	1,312,318	1,584,307	1,659,600	1,642,200	7,128,556

Source: Boston Redevelopment Authority, Research Department, January 1990.

Projected Quarterly Vacancy Rates for All Districts, Class A, 1989-1994.

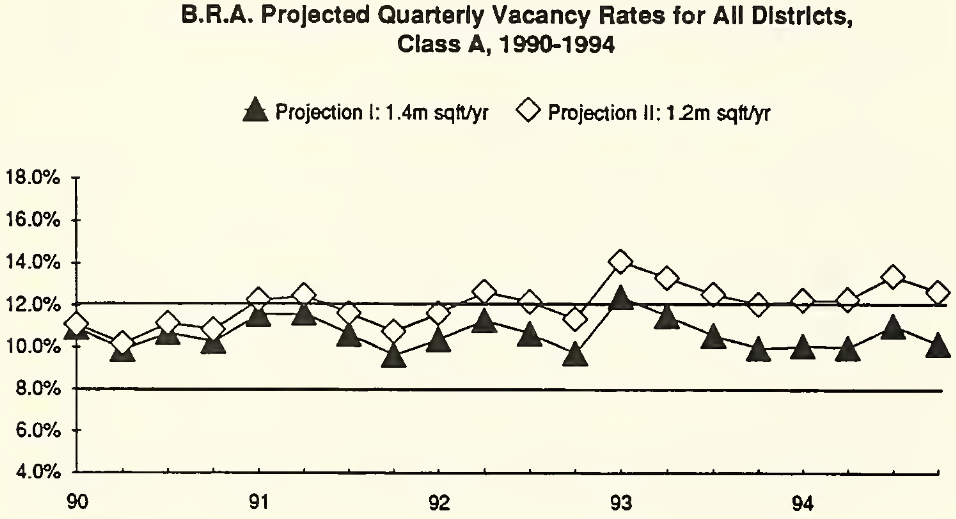
The data from this pipeline of proposed office developments have been joined with the known stock of office space to project vacancy rates through 1994. Two projections have been calculated, one

using an annual absorption rate of 1.4 million square feet and the other using 1.2 million. These absorption rates are based on the office employment projections presented above, and are close to the 1.3 million square foot average annual absorption experienced over the last 20 years in Boston. The two projections have been calculated quarterly, beginning with the first quarter of 1990 and running through the fourth quarter of 1994. As shown in Figure 13, the vacancy rates remain in the range of 9 to 13 percent through 1994, well below the national average downtown vacancy rate of 16.4 percent.

Office development to the year 2000.

The BRA expects the continued strong office market to encourage investment beyond 1994. Close to 5 million square feet of office construction is now proposed for this period, ensuring adequate space for Boston's growing economy.

Figure 13



Source: Boston Redevelopment Authority, Research Department, January 1990.

The Mega-Projects

The so-called "mega-projects" of the 1990s will bring a massive infusion of jobs and money to Boston, while building the necessary foundations for continued regional economic growth into the 21st century. They include the depression of the Central Artery, the construction of a third traffic tunnel beneath Boston Harbor, and the massive harbor clean-up project. These projects, along with other major public works scheduled for the next few years, will provide a great deal of construction employment and contribute importantly to job growth in many other local industries, including office-based businesses. The projects are being planned to avoid or mitigate disruptions of access from suburban residential areas to the downtown business district.

Central Artery & Third Harbor Tunnel

The Central Artery was designed in the 1950s for 75,000 vehicle trips per day, but by the mid-1980s it was carrying 180,000 vehicle trips daily. The Artery was designed as one of a series of roads that would facilitate the regional flow of traffic through and around downtown Boston. The other components were never built due to opposition from various neighborhoods, so the Artery has borne a traffic burden unanticipated when it was constructed. Many of its users are not trying to reach downtown, but are instead passing through to the north or south, or heading to Logan Airport from the south or west.

To improve conditions for those heading for downtown and those passing through, a two-part project is underway: a replacement artery with expanded capacity, and a four-lane tunnel under Boston Harbor from South Boston to Logan Airport and points north that will divert much of the artery traffic headed to and from the Callahan and Sumner tunnels. A new ten-lane Central Artery will be constructed under the existing elevated roadway while the latter continues at full six-lane capacity. After extensive relocation of utilities under the existing structure and in South Boston, excavation under the elevated structure will proceed, followed by construction and covering of the new roadway. Finally, the old structure will be removed.

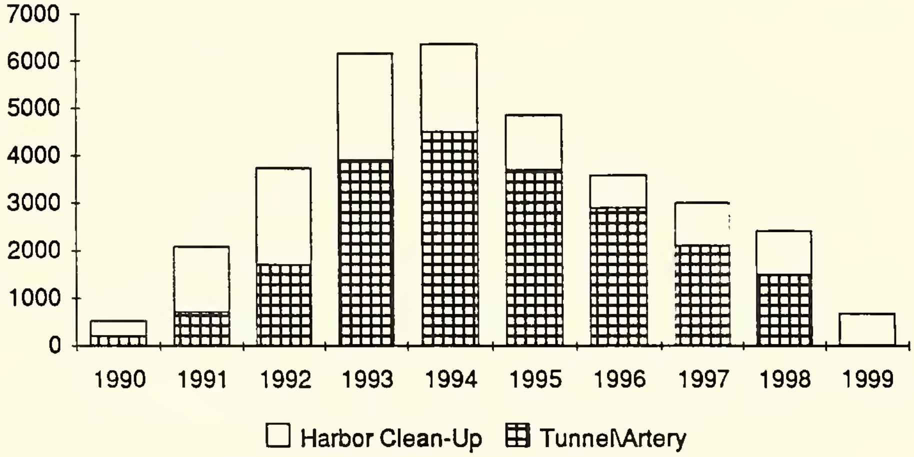
Even with the existing Artery fully open, the construction activity is expected to slow daily commutes to downtown Boston. To mitigate this impact, the State has been improving and adding to alternative modes of reaching downtown, including the "T", commuter rail, and ferries; other options such as ride-share vans, flexible hours, and private bus services will also ease congestion.

The benefits of greatly improved access to downtown and the airport following completion of the project in the late 1990s are beyond dispute: the expanded highway capacity will make Boston an even more attractive place for businesses. Benefits stemming from the construction are also self-evident: an infusion of billions of dollars into the region's economy, and thousands of construction jobs. Less obvious is the powerful effect of the project on employment and demand in other local industries, as well as on state tax revenues.

Together the Central Artery and Third Harbor traffic tunnel will cost an estimated $4.4 billion, with the federal government contributing 90 percent of the money and the state providing the remaining 10 percent. However, this direct spending will have a strong "multiplier effect" on the local economy, which will be felt in two ways. Indirect effects will occur when companies involved in the construction in turn purchase other products and services from suppliers; induced effects will occur when workers spend part of their earnings from the project on retail goods and services. An econometric model developed for the project has estimated direct, indirect, and induced effects of the project to total $8.2 billion, with $5.4 billion of that total being locally supplied goods and services. This will have a major impact on local employment in areas other than construction, including services and finance industries.

Direct construction employment on-site will average 2,600 jobs per year over the construction period, with a peak of 4,500 jobs in 1994. Over the four year period 1993-96, construction jobs will average about 3700 jobs per year- roughly equal to the number of construction workers needed to build nearly four million square feet of office space. Figure 14 shows the estimated on-site construction employment by year for the artery/tunnel and harbor cleanup projects over the next decade. In addition to this on-site work, there will be an

On-site Construction Jobs for the Artery/Tunnel and Harbor Clean-Up Projects

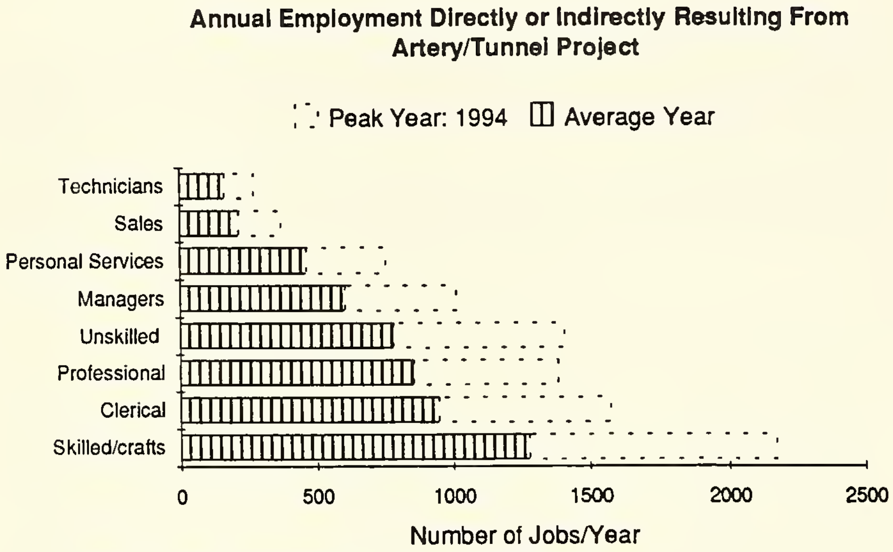


Sources: CATHAT Supplementary E.I.S. Draft and MWRA

Figure 14

annual average of 500 off-site construction jobs generated by the artery/tunnel, with 900 in the peak year. The average annual value of demand for local construction services will exceed $155 million.

According to the econometric model, the total direct, indirect and induced impact on non-construction jobs in Suffolk County alone will be will be even greater. The model predicts extra non-construction employment in Suffolk caused by the construction in an average year to be over 3,500 jobs. This includes 1,600 jobs in services, 440 in retail, 650 in stone and clay manufacturing, and 380 in finance industries. In the peak year the total number of such jobs will approach 5,850. Impacts in the entire metropolitan area are projected to be even greater, exceeding 10,000 extra jobs in the peak year. Average annual demand generated by the project for these local industries' products is estimated at $51 million for retail, $76 million for finance, $112 million for stone and clay, and $128 million for services.



Source: CATHAT Supplementary E.I.S. Draft, June 1989

Figure 15

The total estimated increase in employment by job category for Suffolk County in the average year includes 1,278 skilled/crafts, 785 unskilled, 949 clerical, 859 professional specialty, 605 management, and 463 in personal services. The numbers are substantially greater for the peak year; Figure 15 shows the breakdown for the average and peak years. About half of these jobs are office-based, filling up to 750,000 square feet of office space in the average year; in the peak years between 1993-96 these office-based jobs could be expected to need about one million square feet of space.

The fiscal impact of the project on the state budget is predicted to be positive. The state's contribution to the project costs should be completely repaid by increased revenues arising from incomes and sales directly and indirectly associated with the project.

Harbor Cleanup

The Harbor Clean-Up project consists of the construction of one of the world's largest sewerage treatment plants at Deer Island; the separation of the combined sewer overflow system; and the creation of a storm water management system. The current wastewater system discharges raw sewage into Boston Harbor whenever there is a heavy rainfall. The two sewage treatment plants currently perform only primary treatment and discharge waste into the outgoing tide through a pipe located about one mile outside the harbor.

The Massachusetts Water Resources Authority is commissioned to create the infrastructure necessary to stop the stream of sewage into the Harbor, so that eventually the harbor can resuscitate itself. The new sewage treatment facility will perform both primary and secondary treatment, and the discharge point for the effluent will be ten miles off the coast in Massachusetts Bay. The separation of the combined sewer overflow system and storm water management system will be a massive and costly task which will require the construction of gigantic holding tanks and, in some instances, creation of a whole new system dedicated to the drainage of storm water.

This project will cost an estimated $6.1 billion, with completion expected in 1999. Though it is more expensive than the artery/tunnel project, the nature of the construction activity is less labor-intensive. Construction employment for the project will range up to a peak of 2,250 jobs in 1993, with an average of 1730 jobs annually during the five year period 1991-95. See Figure 14. In addition, the project will need support and staff workers, adding nearly 500 jobs to the peak year total. These will total over 6,000 jobs in each of the peak years of 1993 and 1994. While the multiplier effect of the harbor clean-up employment and spending has not been calculated, it will have large indirect and induced effects on employment and spending in the same manner as the artery/tunnel project.

The 1990s Peace Dividend

As significant political and economic events in the Soviet Union and Eastern Europe occurred on a daily basis throughout 1989 and into 1990, the prospects for a more peaceful coexistence between the East and West have become ever more bright. A consensus is emerging that envisions a new age of reduced tension and disarmament agreements beginning in the 1990s allowing for a bilateral reduction in defense spending and generating, in turn, a "peace dividend". From the testimony, statements, and research by a variety of experts in the fields of defense, economics, politics, and public policy, several strongly supported themes have emerged. Past and present American policy makers in defense and foreign relations conclude that defense budget cuts of up to fifty percent can be achieved, beginning gradually from now through the year 2000, without jeopardizing security given the current status and direction of events. Most economists agree that whatever form of "peace dividend" emerges will undoubtedly generate economic growth, increase American productivity, and spur our global economic competitiveness. Finally, a range of thoughtful proposals for the alternative use of the "peace dividend" have emerged from the research of many interested parties which have realistic, workable ideas that could be pursued to the betterment of the American and World economies.

The American economy can be expected to improve from alternative uses of defense expenditures. A wide range of uses for the "peace dividend" have been proposed and there is, as yet, no clear consensus on what should be done. As defense spending declines from over six percent of GNP to possibly four percent industrial growth trends will be affected offering possibilities for expansion in new directions. On one side of the issue are those who prefer that the savings on defense represent a way to reduce the federal budget deficit which would lead to a direct strengthening of the economy and increased capital investment. On the other side are those who would use the resources to invest directly in vital programs to improve education, drug abuse, infrastructure, the environment, housing and other programs that could help alleviate hindrances to economic growth and economic competitiveness. In between, others prefer some combination of savings

and alternative spending. There is a range of views as to the approach to planning for a peace economy. One view is that industries should be given a free reign to invest and diversify as they would like, with some minor stimulus and encouragement through tax laws. Another views government as having a direct role in helping to convert military manufacturing plants to peacetime production and for providing alternative scientific and engineering projects for existing companies and their workforces. Clearly, planning for a peacetime economy will require some policy options and economic guidance.

The conversion of the American economy from reliance on defense spending to whatever the alternative will represent a challenge and an opportunity for Massachusetts and the greater Boston region. The overall effect of the "peace dividend" on the region could be significant since Massachusetts is the fourth ranking state in the nation on receipt of defense prime contracts and the Boston metropolitan area ranks fifth in the same category among the nation's metro areas. In the short term some dislocation of economic activity will occur among industries but the immediate cuts in military personnel and bases probably will not have as severe an impact on Massachusetts which specializes more in defense Research and Development (R&D) activities and some related manufacturing. Some of the modern sophisticated scientific and engineering military applications will likely remain amidst the roster of cuts.

Over the long run alternative federal spending and conversion to commercial manufacturing and scientific research could have a large positive effect upon the Boston regional economy. Regional defense industries will diversify while alternative investments in human capital, new scientific ventures, and new plant and equipment will strengthen the region's economic base. Boston's historic role as a center for higher education, venture capital, and scientific and engineering applications could make the area a leader in the regional as well as the national "peace dividend" economy.

Defense Spending in the International, National, and the Massachusetts Economies

The U.S. spends an exorbitant amount on defense compared to our major economic competitors; over 6.3% of G.N.P. compared with

3.3% in West Germany and 1.0% in Japan in 1984. The U.S. defense budget of $297 billion in FY 1990 was larger than the G.N.P. of most of the world's countries. Furthermore, R&D in the U.S. is heavily dependent for funding from the Defense Department as $62 billion of the total U.S. $124.25 billion spending on all forms of R&D is funded by the public sector and 70% of the total, or $41 billion is Defense Department R&D. Other countries spend much less on defense, have very little defense R&D ($12 billion in Japan), and most of them fund their R&D through the private sector for commercial purposes. Much of the analysis of these defense spending and R&D spending issues have been studied by Seymour Melman, director of the National Commission for Economic Conversion and Disarmament.

At the state level, Massachusetts ranked fourth among all states in defense prime contracts with $7.2 billion in FY 1988. This level was even down 20% from the high of $8.7 billion in FY 1986. Over 32% of Massachusetts prime defense contracts, or $2.3 billion, in 1988 were for R&D, providing substantial economic benefit for scientific, engineering, and high-technology companies. Greater Boston ranked as the fifth largest metro area in the country in terms of defense contracts, with 3.1% of all defense prime contracts in 1988, and is headquarters for several major contractors. Greater Boston is even more specialized in defense R&D as the 9.1% of all Defense Department R&D is spent in the metro region, ranking Boston third nationally.

These data on defense spending and defense R&D show that the American economy is heavily reliant upon defense spending at the same time as its economy has fallen behind other major economic competitors in the world in terms of global competitiveness. Seymour Melman has written that:

> The military budget represents an enormous capital fund that could be put to productive civilian use. Military spending is 6 percent of G.N.P. but it pays for the services of 25 to 30 percent of all our nation's engineers and scientists and accounts for 70 percent of all Federal research and development money, $41 billion in 1988. These are resources that can be far more productive if used in the civilian sectors of the economy.

As a result of our military expenditures, by the close of the 1970s, the United States was no longer a first class industrial economy with respect to productivity growth, research and development, the quality of infrastructure, average wages, competitiveness and standard of living. From this second-rate condition, the United States is headed for further decline. And if we become a third-rate industrial economy, we will lack forever the means of production necessary to repair our deficiencies.

The Current National Debate on Uses of the Peace Dividend

Proposals to cut defense spending are now in motion. Secretary of Defense Cheney proposed that Congress look into defense cuts of up to $167 billion from FY 1990 through FY 1994. Although the January 29th Administration proposal for FY 1991 calls for a real (inflation adjusted) decline to $292.1 billion or 2.6% in defense spending from the previous year, Congress will consider alternatives as well, such as Representative Boxer's (D-CA) proposed $12 billion cut beginning in FY 1991. U.S Representatives Weiss (D-NY), Oaker (D-OH), Gejdenson (D-CT), and Mavroules (D-MA) have proposed new Defense Economic Adjustment Acts with concrete plans for the implementation of the conversion activity including federal aid for planning, special unemployment assistance, and labor retraining programs. Former defense administrators such as McNamara, Kaufmann, and Korb are suggesting even deeper long-range defense cuts of up to 50% of current levels. Lobbying groups and academicians are also offering suggestions on levels of cuts and alternatives for the funds; a short list includes Melman and Feldman of the National Commission for Economic Conversion and Disarmament, Reismann of "Social Policy" magazine, Isard of Peace Science Society International, Isaacs of the Council for a Livable World, and six Nobel Laureates of Economists Against the Arms Race (ECAAR).

These events show that a consensus is being reached on the economic need for defense cuts but differences remain about the size of cuts and about what should be done with the "peace dividend". The debate has offered the following general categories of "peace dividend" alternatives: 1.) reduce the federal deficit and restore macroeconomic health; 2.) fund vital programs that promote social and economic competitiveness- education, drug treatment, environmental clean-up, in-

frastructure improvements, health care, and housing; 3.) use governmental resources and enducements to actively convert defense manufacturing to commercial manufacturing and also to promote the diversification of military industries; 4.) use public policy and resources to redirect scientific and engineering R&D from military purposes to private commercial and non-profit applications through new ventures such as space, robotics, industrial technology, transportation, computers, and similar efforts; or 5.) some combination of the above alternatives What is evident is that a need exists for a national economic strategy which uses the "peace dividend" as an investment in global economic competitiveness in America.

The Implications for Massachusetts and Boston

The state and local economies must be prepared for the changes in reduced defense spending just as the nation does. Massachusetts needs a strategy for defense conversion and economic diversification. The Massachusetts Department of Employment and Training (DET) has done some background research to profile the defense industries in the state, study the adjustments that must be made to the State economy, and identify the economic institutions and programs that now exist which could be used in adjustment to defense conversion and diversification. Proposed State legislation introduced by Cohen (D-Newton) and Magnani (D-Framingham), address using state institutions to plan for and monitor the defense build-down. A more definitive and comprehensive defense adjustment policy must be readied at the state level.

Greater Boston will surely be affected by the changes in defense spending just as it was when the end of the Vietnem War affected the region. But, this time most of the bad consequences could be avoided by foresight and planning by both the public and private sectors. Already some defense industries have begun to diversify on their own. Regional manufacturer Raytheon has succeeded in shifting half of its business to non-defense technologies such as commercial air traffic guidance and safety systems. Indeed, Boston's unique resources in higher education, finance, and scientific and engineering applications could be just the tools necessary for Boston not only to deal with the challenges of reduced defense spending but to lead the nation in the

direction of planning for capturing a "peace dividend" which enhances global economic competitiveness.

Specific Suggestions for Using the Peace Dividend

Seymour Melman, director of the National Commission for Economic Conversion and Disarmament, has proposed "a peaceful way to spend $165 billion" that "can be made available from savings from ending the cold war". His recommendations for reallocation of military spending entail federal outlays of: $30 billion on a comprehensive housing program, $30 billion for increased Department of Education spending, $26 billion for infrastructure repair, $23 billion on preschool and other education needs, $17.5 billion for radioactive waste clean-up, $16 billion for toxic waste clean-up, $12.5 billion on miscellaneous health costs, and $10 billion for electrification of the American rail system. Melman advocates "deliberate planning for conversion from a military to a civilian economy" as a requirement for utilizing the peace dividend. He also advocates for proposed revisions to the Defense Economic Adjustment Act, sponsored by Representative Ted Weiss which provides for a process of planning for defense conversion and economic rebuilding.

Robert S. McNamara, former Secretary of Defense, testified to Congress that "the $300 billion annual Pentagon budget could be safely cut in half over the next decade because of the reduced threat from the Soviet Union and Eastern Europe." Through this dividend, McNamara said that America "should be able to enhance global stability, strengthen our own security and, at the same time, produce the much-needed restructuring of the economy." Lawrence Korb, director of the Center for Public Policy Education at the Brookings Institution and former assistant Defense Secretary under President Reagan, endorsed these cuts but offered less specifics on where the billions saved should be spent. The importance of their testimony was in the professional judgment that specific arms cuts could be made without security problems and with resulting economic benefits.

On the state and local level, specific proposals have been made. State Representatives Cohen and Magnani have proposed specific legislation that would: create an economic diversification committee

to encourage industrial conversion from defense to civilian production, expand the duties of an economic monitoring group to track diversification efforts, and add both an economic diversification specialist and a business management expert to the Economic Stabilization Trust a board within the Executive Office of Economic Affairs. In addition, the DET has studied many other relevant topics: attempts at conversion in the nation and state, retraining efforts, Massachusetts defense industry characteristics, government roles in conversion and diversification, future growth industries, and financial and institutional resources at the state level.

For Boston, a recent report by Stevens, Dreier and Brown has offered a proposal for funding housing in the city through the use of a six percent shift in the Federal Budget. The report showed that Boston's annual share of a new federal housing budget, expanded from former defense funds, would be $153 million, which "would meet the city's new housing need for the years 1990 through 2000". The money could be used to subsidize construction of nearly 5,000 low and moderate-income housing units annually which would create $2.4 million in additional property tax revenues for the city and create 7,400 new jobs. This new housing could serve to attract or retain important labor resources in Boston which are threatened by the shortage of affordable housing.

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